No 4

BIG K

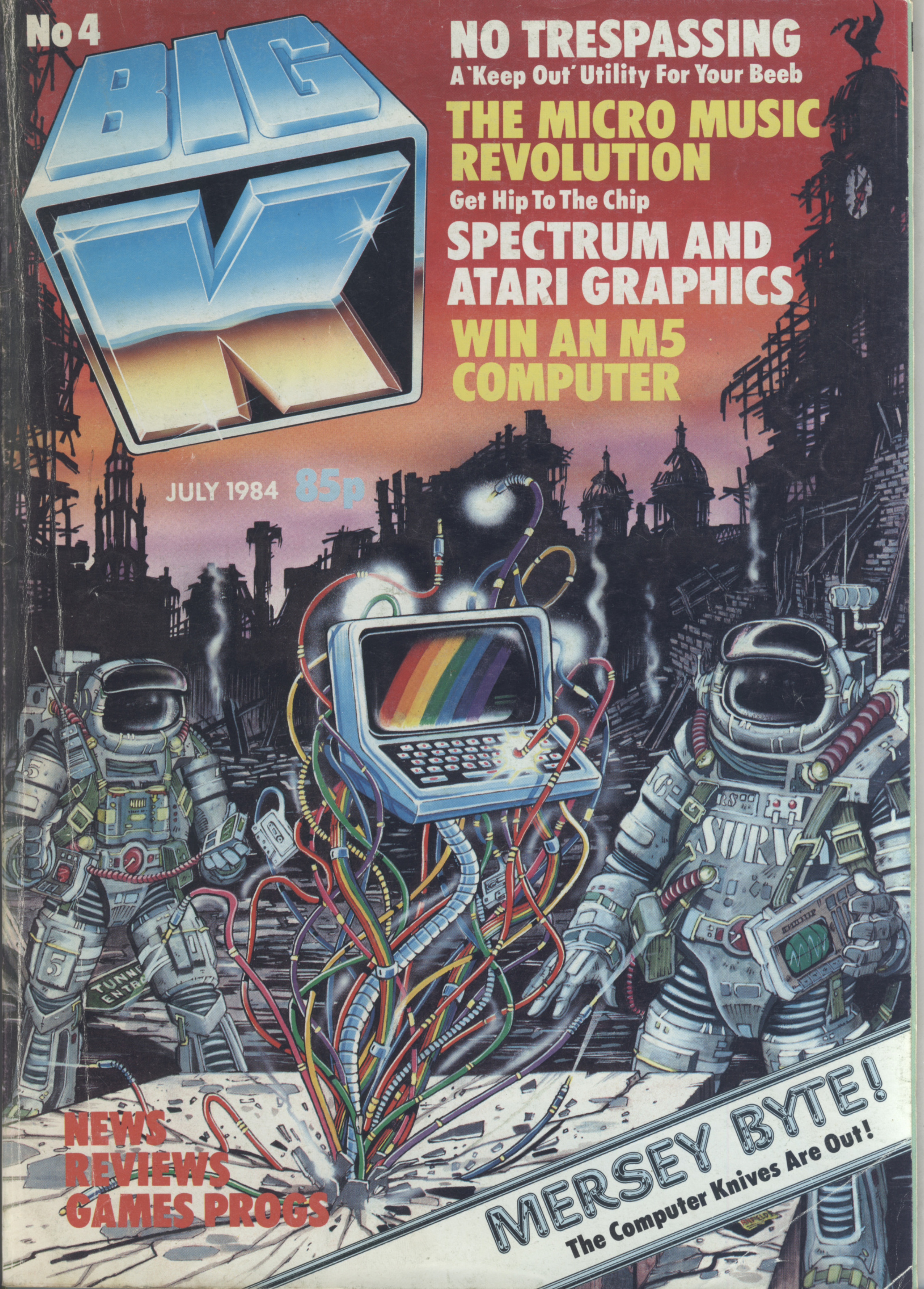
NO TRESPASSING
A 'Keep Out' Utility For Your Beeb

THE MICRO MUSIC REVOLUTION
Get Hip To The Chip

SPECTRUM AND ATARI GRAPHICS

WIN AN M5 COMPUTER

JULY 1984 85p



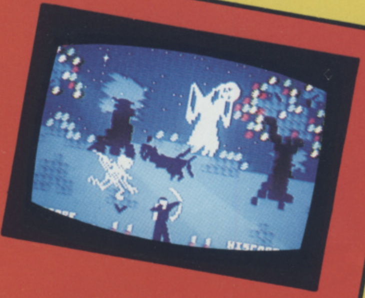
NEWS
REVIEWS
GAMES PROGS

MERSEY BYTE!
The Computer Knives Are Out!

DON'T JUST SIT THERE - PLAY SOMETHING!

FORBIDDEN FOREST

Forbidden Forest is more of a quest than just a game! The action takes place in a four dimensional scrolling forest landscape which many have entered, but none has returned. Yes, I did say FOUR dimensional - day fades into night as the action unfolds! The quest is to seek out and destroy the Demogorgon, mystic ruler of the Forbidden Forest. Before you can even set eyes on him you will have to contend with his army of fearsome creatures, including mutant spiders, showers of giant frogs, snakes, dragons, skeleton soldiers and more! You have only your trusty bow and arrows to depend on!



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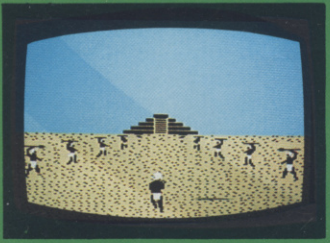
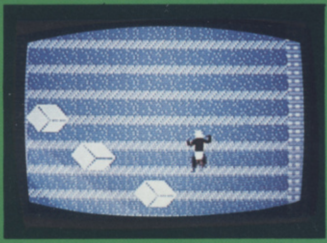
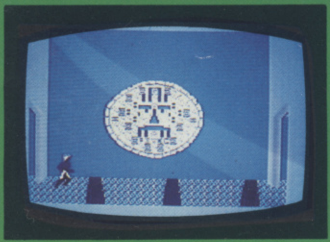






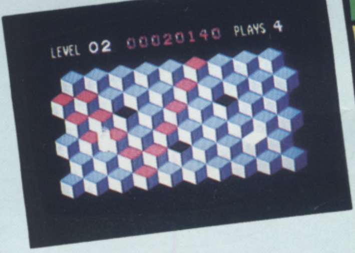
AZTEC CHALLENGE

A challenge on an epic scale! Aztec Challenge takes you on a journey to Mexico and the ancient pyramid of Tenochtitlan. The ancient Aztec gods and their devotees have ensured that no ordinary human can learn the secrets of the temple and live to tell the tale. The pyramid is protected by all manner of treacherous traps and hidden perils - an epic test of your courage and cunning. Aztec Challenge features no less than seven totally different screens - here are just three of them - each of which presents a brand new challenge. We hope your joystick can stand up to it!

SS019

SLINKY

Slinky, the spring, was having fun hopping about when suddenly he came upon a pile of coloured blocks, so he thought he'd play around on them for a while. Much to his amazement he found that they changed colour when he landed on them. Wow! But unknown to him, the blocks belonged to the Wicked Wizard, who sent his friends along to tease our poor hero. Slinky is a real fun package with ninety-nine levels, amazing reward displays, and action replays. Where else could you meet such charming characters as Dusty the dust cloud, Marge the magnet, Ralph the random raindrop, and Lorenzo the chameleon hopper?



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THE SCREENS ARE ALIVE...

SOUND IS probably the most neglected aspect of computer games — witness the measly tweeting of the nation's top-selling micro: the Spectrum. Even on other machines, programming musical noises can defeat even graphics experts. In BASIC, it's a chore.

All this is changing (see p.60). Stereo on the Amstrad and Enterprise tell their own story. Now we have MIDI — a sort of aural MSX — to help you make your micro talk to synthesisers, and keyboards. It's clear that the days of the tin-eared are numbered. From the top, now . . .

TONY TYLER

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STOP/CONTINUE PLAY
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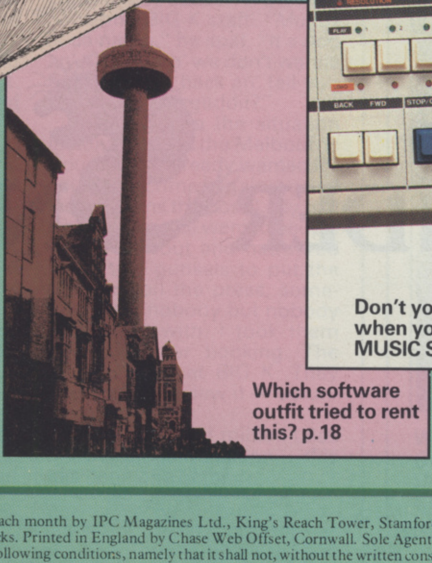
Don't you know a piano when you see one? MICRO MUSIC SPECIAL p.60

COMPUTER SNOBS are on the increase. Spot them p.76



Which software outfit tried to rent this? p.18

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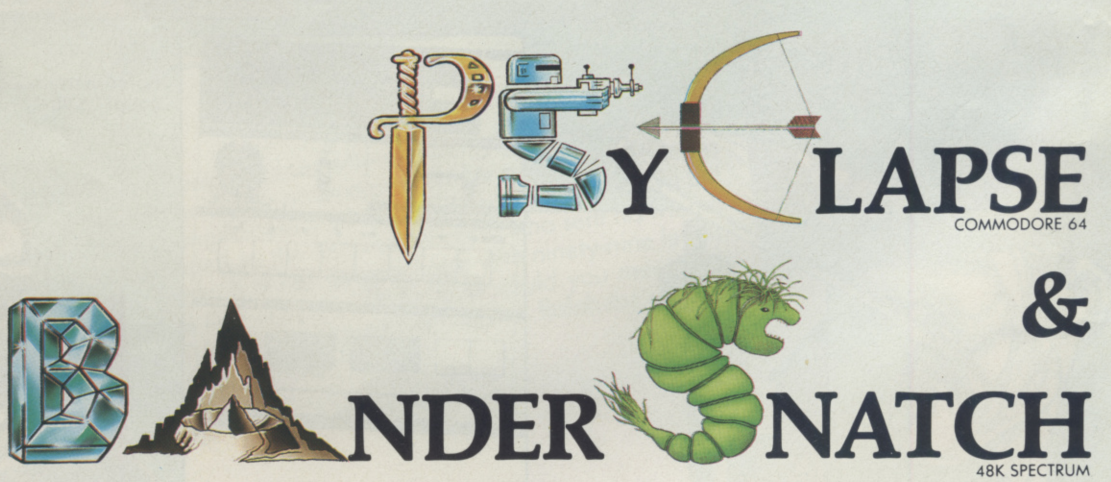


PSYCLAPSE
COMMODORE 64

&

BANDERSNATCH
48K SPECTRUM

imagine
..the name of the game

SUPERPUTERS OFF TO SHAKY START

AS THE MSX threat looms ever nearer in the "affordable" home computer market, manufacturers in Britain and the USA could just be facing a dodgy autumn — if not a winter of discontent — according to informed industry sources.

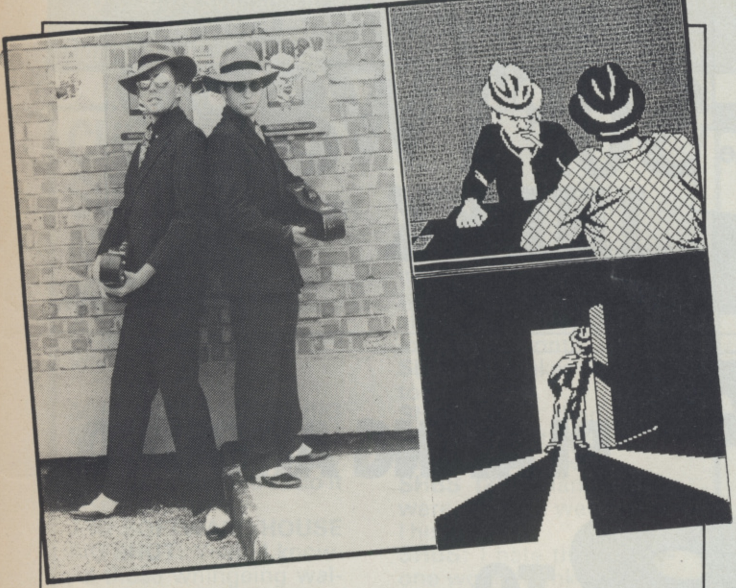
Of the Brit super-computers, the Sinclair QL is now up and running — and attracting excellent reviews despite the lash-up with the "dongle" that attended its real-time (as opposed to promised) launch date. However the bad feeling that grew up as a result of late delivery has not gone away; while the irritation over the large sums of money freely available (at zero interest) to Sinclair throughout the waiting period has now materialised into active consumerist aggravation.

Enterprise (*né* Elan, *né* Flan) is still booked to appear next month — after delays caused by problems with the dedicated video chip. These delays are widely seen as having affected Enterprise's chances short-term — though if the machine lives up to its specifications it could still attract a sizeable user base.

Of the British White Hopes, only the Amstrad CPC 464 all-in-one machine, with its superfast BASIC and other goodies, has actually appeared on time and as promised.

The American Coleco Adam, launched in 1983 (though not delivered until early summer 1984) has been dogged by scathing reviews and poor sales (especially in the USA, where it counts), and rumours are now rife of its pending withdrawal from the market. Ailing giant Atari have still failed to make substantial inroads into the UK market with their XL series, and are now more than ever committed to the Atari-Soft project (targeted on Brit computers like Spectrum and US rivals like Commodore).

Meanwhile the standardisation of operating systems inherent in the Microsoft-Japanese MSX project promises to rationalise the domestic computer scene — say some — in such a way as to leave very little room for home-grown competition. We'll keep you posted.



ZAPPING ON THE RATES

HOT ON the heels of that Tour of the Universe (see page 75) comes news of a high-tech Theme Park on the rates!

One as-yet-unnamed county council in the north of England has employed a firm of leisure consultants to find out just what they could put in such a park. Computerised simulators and laser-disc games that you walk through(!) are high on the list of possibles. A bank of arcade games two acres in size is also mooted. It would take every game as it came onto the market.

The park might also function as a museum for great computers and games that you have loved. "Secret games experiences crafted by electronic leisure specialists," are also promised, whatever these are.

When BIG K can pin down which council can afford such splendour we'll let you know . . .

Smash the cuts, OK?

WHO'S DA MUG, MUGSY?

MY NAME is Friday. I'm a cop. Things had been pretty quiet that day, just the usual crop of homicides and muggings. Then the call came — the guys at BIG K had problems. I rushed over to their office. They were right.

A couple of criminal-looking types had taken over the joint. By their clothes they looked like ageing ex-members of the cast of "Bugsy". Fedoras, spats, shades, the works. They carried violin cases but sure didn't look like budding Steffan Grappellis.

One lounged by the window. "Nice pice a' glass ja got here, fellas. Real shame if sumthin' happened to it — long way down, too. Ain't dat right, Joey?" His partner grunted agreement and reached for his violin case.

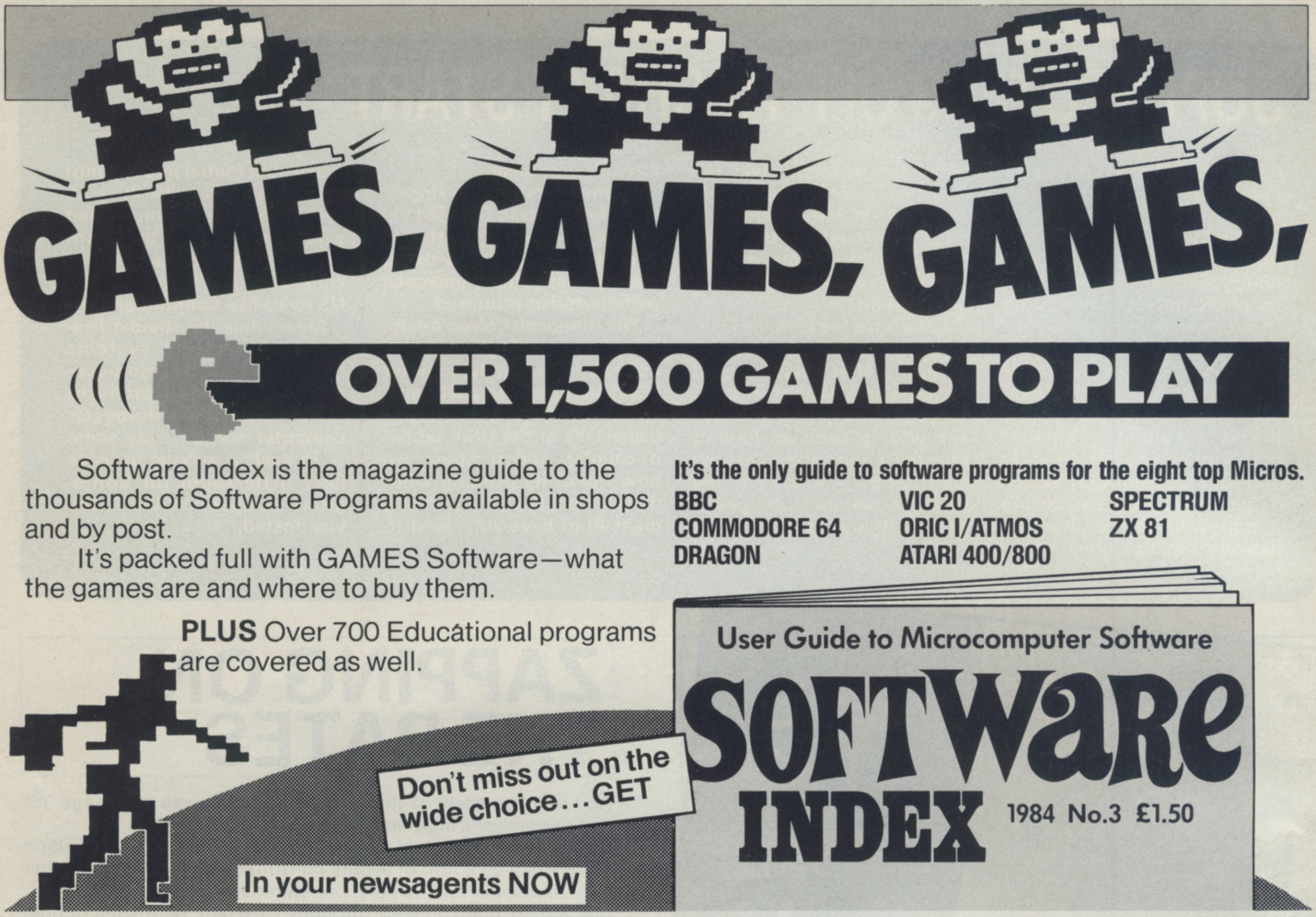
My hand gripped my heater. The case opened. Inside there was no rod, no violin, just dozens of copies of a game called *Mugsy*.

"Da Boss Lady wants yuh should revoo dis supoib noo Spectrum game. An' she wants you should say nice things about it, dig?" So saying the creep forced a cassette onto the cowering BIG K staff. *"Mugsy* is da name," he spat. "It's noo an' it's neat an' we don't wanna haveta come back an' tell yuh about it again, geddit?"

I summed up the situation instantly. It was the Melbourne House Mob, already wanted for countless crimes against good taste. Seems the Boss Lady had a new game she wanted people to know about and had hired these two gunsels to put the pressure on the press, something that nobody but nobody gets away with. I took them downtown for booking. The game stayed at BIG K. They might even review it — voluntarily.

There are eight million tales of Software Intimidation — this has been one of them.

Who's this? M. SMITH completing the 964th screen of *Positively Obsessive Miner III*? No, just one of the EVIL DEAD, celebrating the release of the Palace Software game of the same name on CBM 64.



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NO REGRETS, SAY ATARI AT NEW GAMES LAUNCH

"THERE WILL be no compromise for the sake of cost." So said Atari International's U.K. Marketing Director of the much commented upon high price of Atari software in the British market. The remark was made at the launch of a new range of Atari computer and video game software in May. Though prices still remained high (compared to most other companies) some movement downwards was noticed on the prices of the new games.

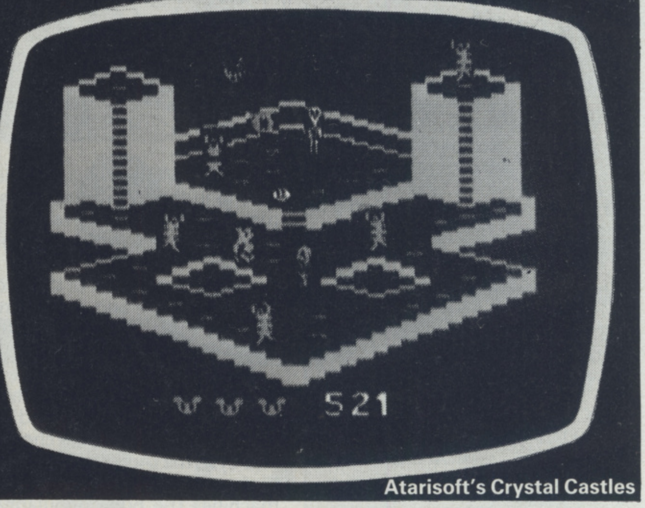
Millipede and *Crystal Castles* are the latest arcade hits to appear in the VCS format, at £24.99 and £29.99 respectively. *Oscar's Trash Race,* based on TV's 'Sesame Street', comes in for the nippers at £19.99.

Millipede also appears — as a ROM cart for the Home Computer System, along with *Moon Patrol* — £24.99 each.

The second wave of Atarisoft releases brings more arcade classics to major micros.

Pole Position appears in cassette-based versions for Spectrum 48K and BBC at £14.99 each and as a ROM for the Commodore 64, £24.99. *Robotron: 2084* comes in Spectrum 48K, BBC and Electron editions at £9.99 each, with *Ms Pac-Man* in Beeb and Electron formats at £12.99.

Dig Dug is available in the BBC version now and should hit the Electron market next month, both £9.99. That just leaves *Donkey Kong Jr.* swinging onto the Spectrum 48K at £14.99.



Atarisoft's Crystal Castles

CHEAPO SOFTWARE—MAKERS WORRIED

(Overheard on a 'crossed line')

SOFTWARE HOUSE BIG SHOT; . . . -ing terrible! What really gets up my nose is we wanted to do it first.

2ND SOFTWARE HOUSE BIG SHOT: Yeah, I know. All those whingeing wallies —

SHBS: — Backstreet no-hopers —

SHBS (2): . . . Complaining and forcing your prices back up.

SHBS: Now these Masterchronic —

SHBS(2): Mastertronic, you mean.

SHBS: Yeah. Cleaning up like we could've. Under two quid a copy and they shifted over 200,000 units in the first month.

SHBS (2): Makes you want to weep.

SHBS: Yeah, then along comes Atlantis or whatever they're called . . .

SHBS (2): Atlantic Software. They're well in too, I hear.

SHBS: I hate them. Anyone would think the punters really wanted cheap software . . . did you say something?

SHBS (2): Me? No.

SHBS: Must be something wrong with the line.

SHBS (2): 'Ere! You don't think . . .

(end of tape)

GARBAGE IN, GARBAGE OUT

by The Shadow

WHICH MAJOR Liverpool software house executive had his house raided earlier this year by CID types looking for dodgy tapes. . . And which CID force was acting on "information received" from another (rival) major Liverpool software house? . . . Great town, Liverpool . . . **The Shadow** knows all, for he walks by night. . .

Totally Uninteresting Fact No. 74: while many major companies would like to look down on the mighty **IBM, The Shadow's** colleagues at **Big K** actually do! Physically, that is; the mag's lofty eyrie above London's South Bank gives them a *Defender's* eye view of neighbouring **Big Blue** offices . . . Get your hand off, sir! . . . **The Shadow** sees all, for he flies by day. . .

Congrats to **BIG K's Steve Keaton,** who conquered his social terrors and his inborn lust for alcohol for long enough to qualify as a *Pole Position* prizewinner (3rd place, actually) at a recent **Atari** thrash to launch new games . . . Despite being pipped by two other hacks, **Keaton** complaineth not, since his prize was a slow but functioning (and totally safe) **Atari** Digital Clock, while the unlucky first prizewinner now finds himself committed to a trial circuit of Silverstone . . . Hello, **Rajeev Sood,** consumer extraordinaire. Department of Unhappy Coincidences: even while an **Atari** bigwig was being publicly and cheerfully optimistic about the future of the dedicated videogame machine (you know, those things without keyboards), another nail was being driven into the coffin of the ailing format by **Virgin Games Centre's** announcement that no longer will they (largest retail operation in London) sell said systems . . . It's a tough old world . . .

Congrats to **Silversoft** for a dazzling, witty (it says here) new concept: in *Worse Things Happen At Sea* (Spectrum 48K) you have to keep a cargo ship going while leaks spring, etc. Nice graphics, good plot line — but the best touch is that the cargo consists of packing cases clearly labelled **QL.** Do **Silversoft** know something **The Shadow** doesn't? . . . Course not . . .

Logging off . . .

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The Game: ACORN NIXED BY BEEB LINK?

AFTER THE BBC micro, Acorn are now hotly tipped to supply a games machine for The Game, Yorkshire TV's interactive computer game quiz-show first exclusively reported three months ago in Big K.

But it now appears unlikely that Acorn will produce their Business Machine (the ABM) in time to fit the bill.

Insiders say that Yorkshire TV must first face the wrath of the Independent Broadcasting Authority — who vetoed an ITV micro when the idea first came up last November. And then there's the sticky point of the Acorn TV "monopoly".

New firm Data Technologies can make the BBC micro think like an IBM PC — it's called The Graduate. For £600 (or £869 mail-order) you can use the PC's version of the MS-DOS operating system along with the BBC O/S.

A licensing deal means that Acorn will both sell and support The Graduate. A cut-down version for the Acorn Electron will make the latter the cheapest IBM PC clone on the market — for under £1,000 all-told. And this is just the machine that YTV want, with the proviso that a modem can be squeezed in the same box without taking the price over £1,000.

Yorkshire TV want to clash in on all those BBC micros out in the market and Acorn are keen to help. All they need now is a nod from the IBA.

K-tel
COMMODORE 64
DISK
IT'S ONLY ROCK'N'ROLL
ODYSSEY
CITY ATTAK

NO DISC? THEN YOU'RE A WALLY!

BY THIS TIME next year, as many as one in three computer owners may possess a disc drive or some similar form of fast-access mass storage.

And in recognition of this growing trend, more and more games producers are now putting their eggs in the disc-drive basket.

Acornsoft, of course, have for long made their games software available on both disc and cassette, reflecting the vast choice of disc systems (Acorn's own, Torch, Cumana., etc) for the Model B machine. The huge popularity of the Commodore 64 has also stimulted demand for CBM's own rather slow disc system — as recognised by K-Tel, who are now firmly dedicated to Commodore discs (while continuing to issue on cassette interim) and several other companies.

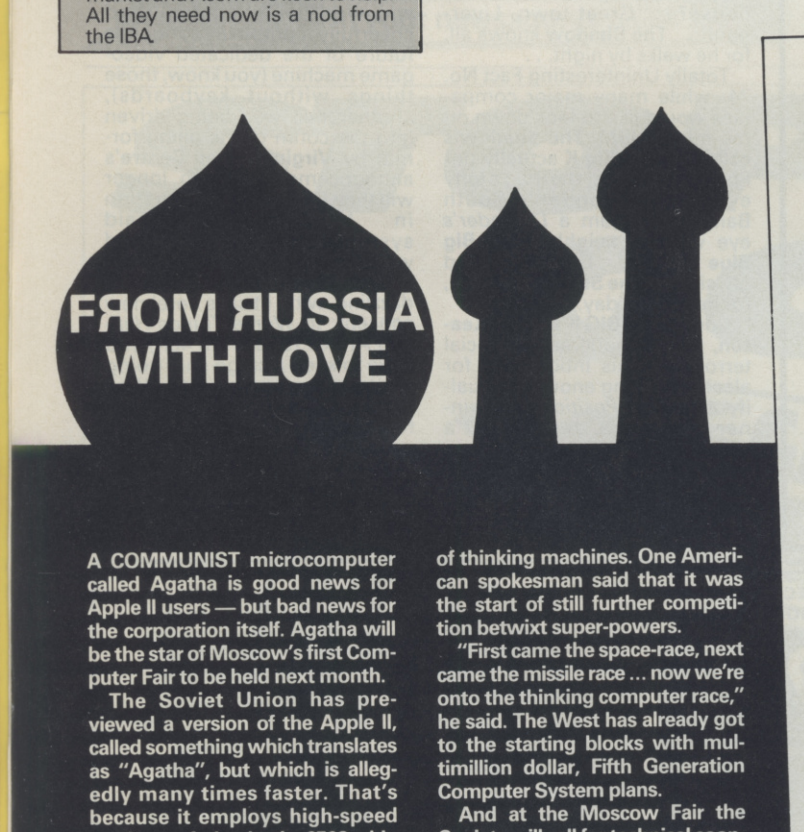
In the USA, where disc drives cost (relatively) less, cassette systems are considered primitive, first-user-only devices; and it is from the US experience (4 out of 5 computer owners apparently on disc) that British companies are now moving across to the superior — but far more expensive — system.

"We firmly believe that disc drives are the coming thing, certainly long-term — and we intend to be seen as a long-term operation", a K-Tel spokesman told BIG K. The company's philosophy is that, once a computer owner has bought his machine, his next major purchase will be a disc system — "and we want to be there ready and waiting".

In addition to the high-speed loading and saving time associated with discs, other advantages are that the large amounts of storage possible can effectively increase the "virtual RAM" of a machine. This is particularly true of adventures — still the fastest-growing type of game in overall popularity terms — where at any given location the next stage of a long program (too big to be stored in RAM) can be auto-booted, with special variables being transferred from one stage of the program to the next.

Joker in the disc pack is of course Sinclair, whose compact and now proven Microdrive system is nearly as fast as most discs, and considerably less expensive. Another problem for the UK hardware men is that while casings, etc., are manufactured here, most disc innards are imported from — you guessed it — Japan. A third poser is the combat currently being waged between the standard 5 ¼" floppy size, and the new micro-discs made by Sony (3½") and Hitachi (3") — both of which can almost match the larger disc sizes in storage capability and access time.

A new format war? We'll keep you posted...



FROM RUSSIA WITH LOVE

A COMMUNIST microcomputer called Agatha is good news for Apple II users — but bad news for the corporation itself. Agatha will be the star of Moscow's first Computer Fair to be held next month.

The Soviet Union has previewed a version of the Apple II, called something which translates as "Agatha", but which is allegedly many times faster. That's because it employs high-speed versions of the basic 6502 chip called 65CO2: C standing for the advanced CMOS process of making the chips.

But that's not all. The entire East Bloc is to cooperate on a research plan to build the next generation of thinking machines. One American spokesman said that it was the start of still further competition betwixt super-powers.

"First came the space-race, next came the missile race ... now we're onto the thinking computer race," he said. The West has already got to the starting blocks with multimillion dollar, Fifth Generation Computer System plans.

And at the Moscow Fair the Soviets will call for technical cooperation with the West on the thinking machine and, ultimately, more trade. If they're successful then Agatha could knock the spots off the Apple IIs now in our shops.

LETTER FROM MOSCOW

By Our Special Correspondent

I am writing to give you update on progress with our own computers. As you are painfully aware, Comrades, the imperialistic capitalists, with their "Free Trade" (Ha!) refuse to sell us any of their devices, and so we devise better ones!

Old Doktor Pavlov is still with us (he's around 130 now, I am told, and still on the same antifreeze we gave B.) and he's working on a revolutionary transmission system.

Is a line of lobotomised dogs, each holding tail of next dog between teeth. Comrade Doktor has trained them to close their mouths whenever tails are squeezed. So you squeeze tail of first dog, pulse travels down to last dog at speed of bite. Amazing.

Progress on miniaturisation goes slowly. Our Tesla Coil technology does not lend itself to such indignities. The research team has experience grave problems with crosstalk, and one even dared to blame our great Tesla Coil itself, saying that the use of 11,000 Volts to signify a 1 was "excessive". As he was obviously demented, poor fellow, we sacked him. (Then threw the sack in the Volga!).

Still, comrades, some things moving very fast indeed. RNSI, the Russian National Standards Institute have agreed a code called RSCII (pronounced "Ruski"). And RusChip, the state manufacturers of highly technological equipment have brought out their RCZ80 "Molotov" and RC6502 "Karlov" processors in an amazing ten days after work was started! Design team has been awarded Order of Lenin, but for some technical reason new chips are in very short supply.

Anyhow, we were very interested and a little concerned with the ZX80 you sent to us last week. It outperformed our business models by a factor of 10 (and so much memory!), so now we're fitting it into the next SS series missiles. I understand Sir Sinclair bringing out new machine . . . Send round the boys and take all he's got. Tell him to invent some story about bugs in design holding up production.

Also find enclosed one case Vodka. Remember Dotechvesky? When he got sent to Siberia for eating crisps during the '76 May Day parade? Haaaa! He managed to become big shot in the spirits industry down there and is sending freebies to everyone who's anyone. The boys at Volgograd know how it feels to be so far from home among the savages and so rustled up a case for you.

Send new Sinclair equipment soon. Don't forget to use the Series X16 30ft by 30ft Diplomatic Bag!

Yours ever,

Boris

SHOCK! HORROR! SCANDAL!

SHOCK! CITYATTAK. The seven screen, all action, machine code game. Superb graphics, smooth game play, a tough challenge for even the hardened arcade action addict. Now available on disk.

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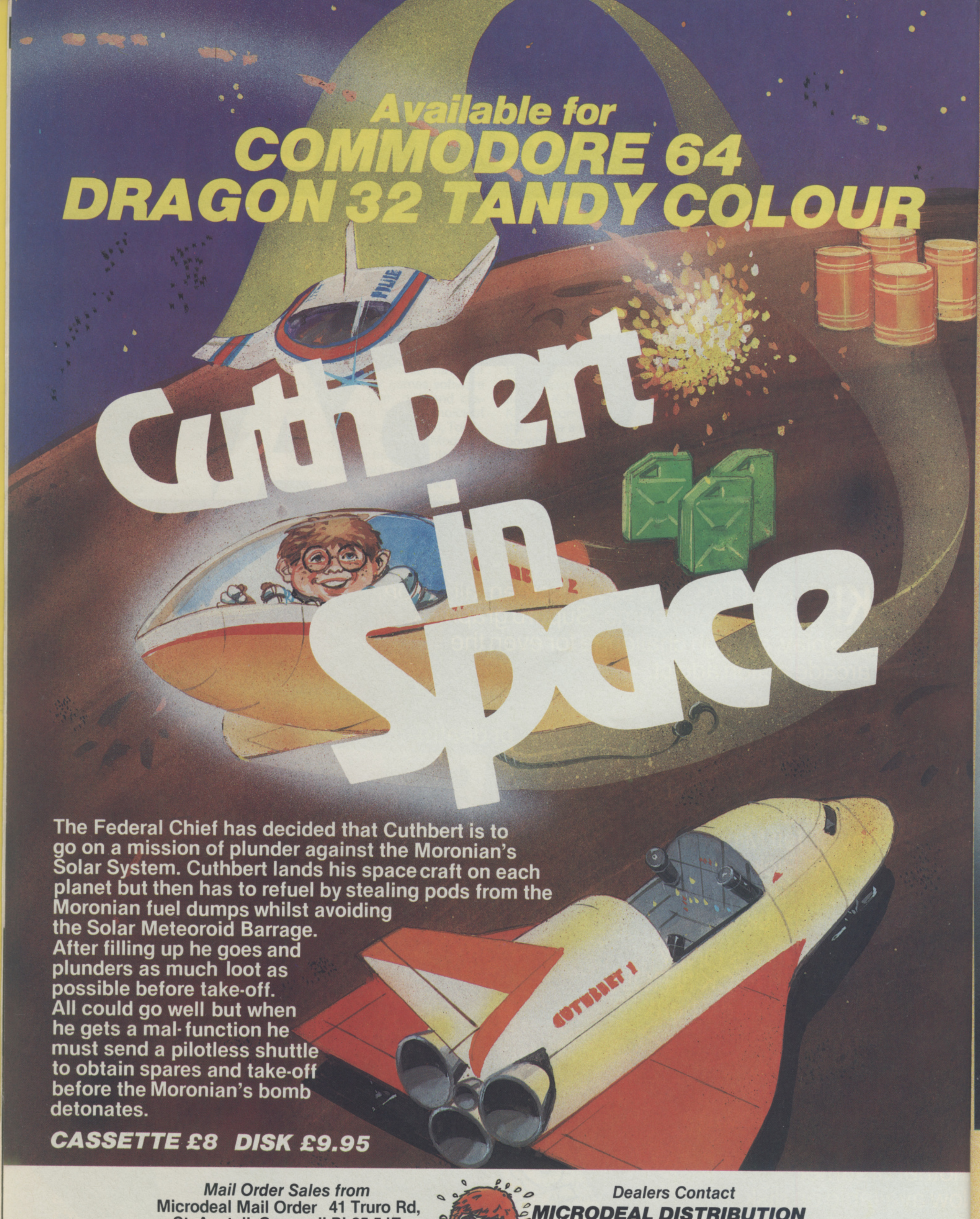

Available for
COMMODORE 64
DRAGON 32 TANDY COLOUR

Cuthbert in Space

The Federal Chief has decided that Cuthbert is to go on a mission of plunder against the Moronian's Solar System. Cuthbert lands his space craft on each planet but then has to refuel by stealing pods from the Moronian fuel dumps whilst avoiding the Solar Meteoroid Barrage. After filling up he goes and plunders as much loot as possible before take-off. All could go well but when he gets a mal-function he must send a pilotless shuttle to obtain spares and take-off before the Moronian's bomb detonates.

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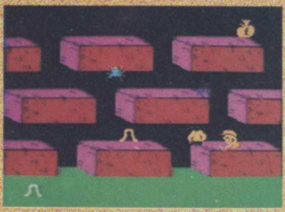

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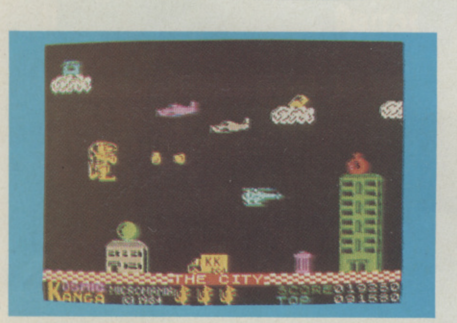

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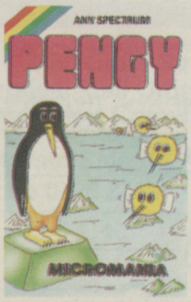
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BIG K's US report from MIKE GOLD . . .

ZIP CODE

How Hawkeye fixed Atari's liver...

Photo: 20th Century Fox
TOKYO
DECATUR

WERE IT not for the Korean War, Atari might be out of business today.

Follow closely: because of his involvement as a front-line medic, a doctor wrote a fictionalized accout of his Korean experiences. Whereas his book wasn't exactly a blockbuster, it did become a very, very successful movie.

In turn, the movie begat an even more successful television series.

The series was M*A*S*H, and it turned Alan Alda into America's biggest and most trusted star.

Throughout M*A*S*H's eleven year run, Alan decided to exploit his trust by succumbing to product endorsements, other than for his own motion pictures. But about a nanosecond after abandoning M*A*S*H — i.e. last summer — Alda signed a lucrative contract, selling his considerable credibility to Warner Communications for use in saving Atari's skin.

DETERIORATION

For Atari was in deep trouble. The company lost $539 million and laid off over 2,500 employees last year. Then they managed to pull off the near impossible: they actually lost a fortune on merchandising items based upon the movies *E.T.* and *Raiders of the Lost Ark.* Of course, they were losing money on lots of other game carts as well.

Faced with competition from Coleco, sales of the 2600 were in a deep slump and retailers were closing out units at about $50.00 (£35.00). Their all-new Atari 5200 proved to be an initial disappointment — it had a tough joystick, a limited software catalogue, and its games were no better than those made for the Atari 400. But the 400 was also in the bargain-basement bins, selling for about one hundred dollars less than the 5200. With Commodore selling their 64s by the truckload and Coleco's forthcoming Adam looking like the Volksmicro, Atari had to find the future — and then find a way to sell that future to a doubtful public.

TRANSFUSION

Hence Alan Alda. Mr. Credibility, Mr. Honesty. And, as far as television was concerned, a commercial virgin. Atari dumped its fledgling line of new computers (the 1200, the 1400, and the 1450) and concentrated on two new machines: the 600 and a new 800. These micros were everything the previous Atari machines were not: they were well designed, very family oriented, extremely useful, and played games like nobody's business. Most important, they used the software already written for the 400 and the 800. And with Alda's clever commercials behind them, they quickly became the computers for families that couldn't afford Apples or IBMs. Most families, in other words.

Atari also cleaned house. They hired a new boss, James Morgan, who made a lot of extremely smart moves.

After straightening the company's chaotic management structure, Morgan put a lid on new product announcements. Henceforth, Atari was no longer in the business of getting gamers excited about stuff they would never see.

That's smart, because as a gamer/reporter, I myself am *still* waiting on Atari's 3-D game system and on their wireless 2600. I played prototypes of both, of course; but it is much easier to make a prototype of something than it is to make a marketable production model. Just ask Coleco.

POST OP

Atari's got something between seven and ten million 2600s still operating in American homes, so there will be a market for their game software for quite some time. The 5200 has finally taken off with a great deal of top-notch software support: Atari has taken a lot of Intellivision and Coleco gamers and brought them back into the Atari fold.

Their future lies in the success of the new micros — if Atari blows it, they won't get a second chance. The field is simply too competitive.

Atari isn't out of the water yet, but at least they can sight land.

STATESIDE CHATTER...

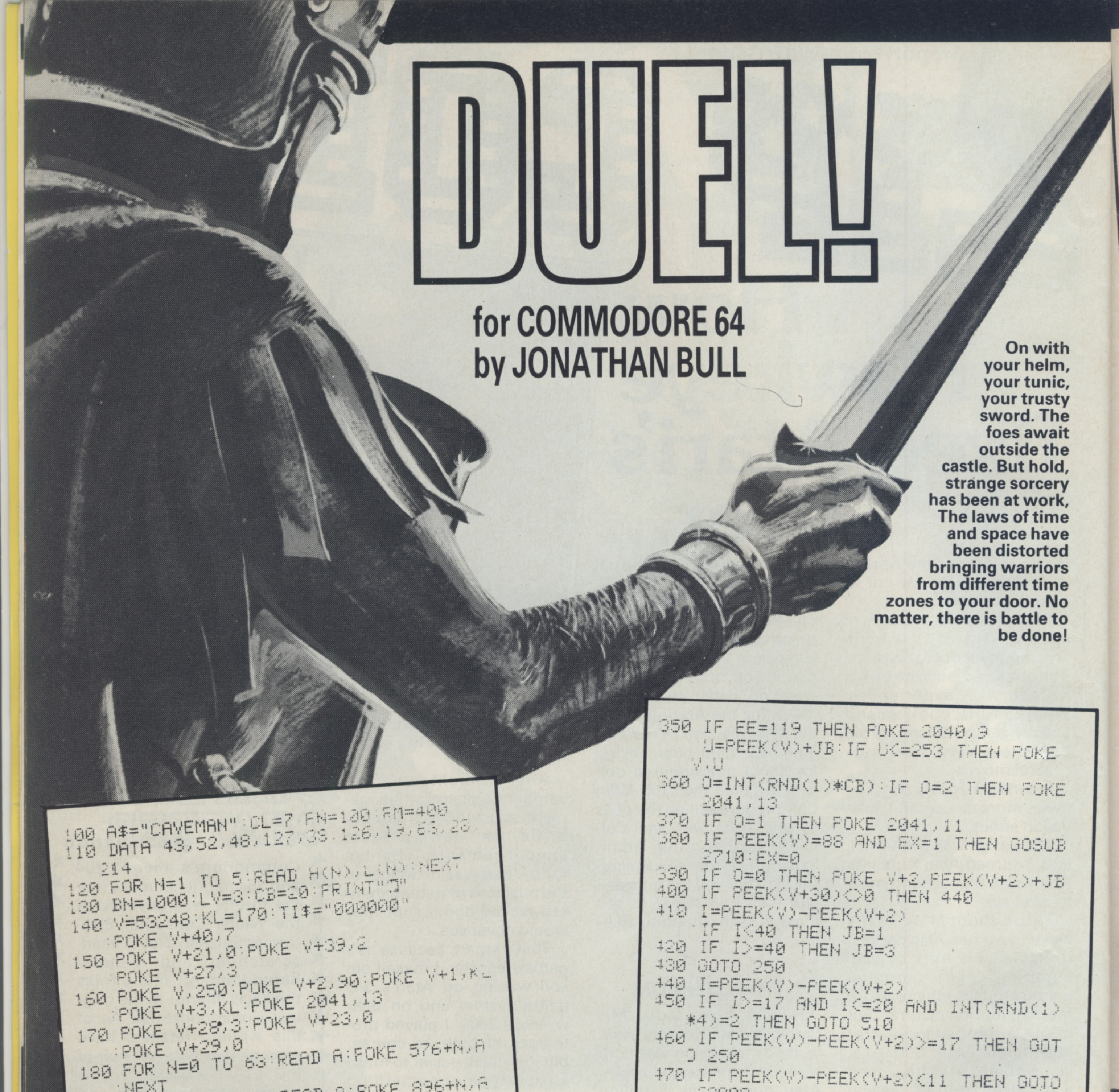
Commodore's alleged 264 and 364 might not make it — the former was unveiled at the Winter Consumer Electronics Show to a lot of head-scratching and general befuddlement; many folks think it is inferior to the original Commodore 64. As of this writing, retailers have seen neither hide nor hair of the 364. If Commodore is going to stay in the low-end micro market, they're going to have to come up with something, and it better play games, and it better be good.

Coleco announced an Adam disc drive — now we'll have to see if they can deliver. Of course, they just laid off 1,300 workers after posting a $35 million loss for the last three months of 1983. Someday they'll learn the lesson: you can't produce an adequate number of good games for several semi-compatible systems (the Coleco, the driving module, the sports module, the roller controller, and the Adam).

More next month.

DUEL!

for COMMODORE 64
by JONATHAN BULL



On with your helm, your tunic, your trusty sword. The foes await outside the castle. But hold, strange sorcery has been at work, The laws of time and space have been distorted bringing warriors from different time zones to your door. No matter, there is battle to be done!

```
100 A$="CAVEMAN":CL=7:FN=100:RM=400
110 DATA 43,52,48,127,38,126,19,63,28,
   214
120 FOR N=1 TO 5:READ H(N),L(N):NEXT
130 BN=1000:LV=3:CB=20:PRINT"J"
140 V=53248:KL=170:TI$="000000"
   :POKE V+40,7
150 POKE V+21,0:POKE V+39,2
   POKE V+27,3
160 POKE V,250:POKE V+2,90:POKE V+1,KL
   :POKE V+3,KL:POKE 2041,13
170 POKE V+28,3:POKE V+23,0
   :POKE V+29,0
180 FOR N=0 TO 63:READ A:POKE 576+N,A
   :NEXT
190 FOR N=0 TO 63:READ A:POKE 896+N,A
   :NEXT
200 FOR N=0 TO 63:READ A:POKE 960+N,A
   :NEXT
210 FOR N=0 TO 63:READ A:POKE 704+N,A
   :NEXT
220 FOR N=0 TO 63:READ A:POKE 832+N,A
   :NEXT
240 GOSUB 1430:GOSUB 1690:GOTO 2150
250 EE=PEEK(56320):QJ=INT(RND(1)*5)
   JQ=INT(RND(1)*RM):IF EE=127 THEN
   POKE 2040,15
260 IF EE=123 THEN POKE 2040,14
270 IF QJ=2 THEN PRINT I$:PRINT W1$
280 IF QJ=3 THEN PRINT I$:PRINT W2$
290 IF JQ=0 AND DI=0 THEN DI=1
300 IF DI=1 THEN GOSUB 2690:DI=2
310 IF DI=2 AND PEEK(V)=94 THEN GOSUB
   2700:DI=0:GOTO 2730
320 IF EE=119 THEN POKE 2040,9
330 EE=PEEK(56320):IF EE=127 THEN POK
   E 2040,15
340 IF EE=123 THEN POKE 2040,14
   POKE V,PEEK(V)-JB:IF PEEK(V+30)<>
   0 THEN GOSUB 2490
350 IF EE=119 THEN POKE 2040,9
   U=PEEK(V)+JB:IF U<=253 THEN POKE
  V,U
360 O=INT(RND(1)*CB):IF O=2 THEN POKE
   2041,13
370 IF O=1 THEN POKE 2041,11
380 IF PEEK(V)=88 AND EX=1 THEN GOSUB
   2710:EX=0
390 IF O=0 THEN POKE V+2,PEEK(V+2)+JB
400 IF PEEK(V+30)<>0 THEN 440
410 I=PEEK(V)-PEEK(V+2)
   IF I<40 THEN JB=1
420 IF I>=40 THEN JB=3
430 GOTO 250
440 I=PEEK(V)-PEEK(V+2)
450 IF I>=17 AND I<=20 AND INT(RND(1)
  *4)=2 THEN GOTO 510
460 IF PEEK(V)-PEEK(V+2)>=17 THEN GOT
   O 250
470 IF PEEK(V)-PEEK(V+2)<11 THEN GOTO
   63999
480 IF PEEK(2041)=11 AND PEEK(2040)=1
  4 THEN Z$="SWORDMAN":GOTO 670
490 Y=0:IF PEEK(2040)<>14 OR I<=16 TH
   EN Y=1
500 IF PEEK(2041)=13 AND Y=1 THEN GOT
   O 670
510 POKE V+2,PEEK(V+2)-2:GOTO 250
520 DATA 63,240,0,255,252,0,245,80,0,
   85,148,0,21,64,0,21,0,0,60,0,0
530 DATA 170,0,0,170,12,0,170,95,255,
   170,140,0,170,128,0,255,192,0,162,
   128,0
540 DATA 162,128,0,160,160,0,160,160,
   0,160,160,0,160,160,0,255,255,0,
   207,207,192,0
550 DATA 0,15,252,0,63,255,0,5,95,0,
   22,85,0,1,84,0,0,84,0,0,60
560 DATA 0,0,170,0,48,170,255,245,170,
   0,50,170,0,2,170,0,3,255,0,2,138
570 DATA 0,2,138,0,10,10,0,10,10,0,10,
   10,0,10,10,0,255,255,3,243,243,0
580 DATA 3,255,0,15,255,192,61,85,240,
   53,153,112,5,85,64,1,117,12,0,84,48
```

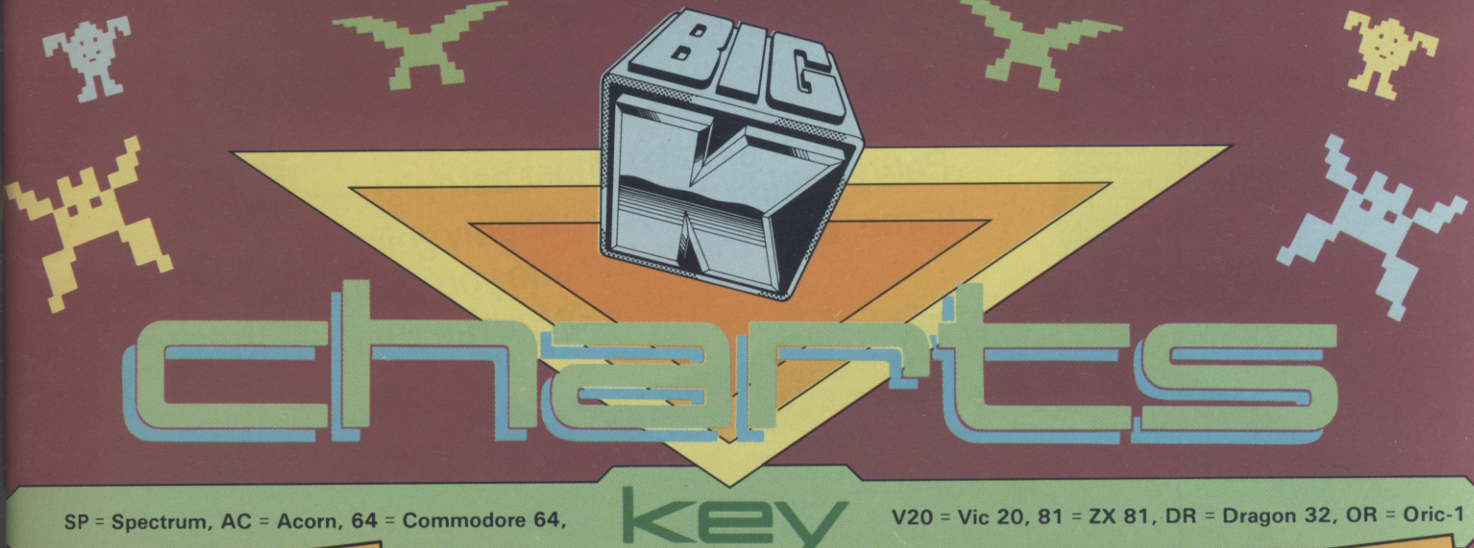
```
590 DATA 10,254,192,42,171,160,42,238,
   160,42,186,160,10,94,128,2,170,0,3,
   255,0
600 DATA 2,138,0,2,138,0,2,138,0,2,
   138,0,2,138,0,3,207,0,3,207,0,0
610 DATA 51,48,0,213,64,0,23,64,15,
   213,84,63,21,0,255,20,0,252,170,3,
   192
620 DATA 170,143,0,238,124,0,169,112,
   0,235,128,0,186,128,0,171,128,0,
   105,128,0
630 DATA 81,64,0,81,64,0,81,64,0,81,
   64,0,81,64,0,85,80,0,85,80,0,0
640 DATA 51,48,0,213,64,0,23,64,0,213,
   80,0,21,0,0,20,0,0,170,0,0
650 DATA 170,128,0,238,128,0,169,127,
   252,235,255,255,186,143,252,171,
   128,48,105,128
660 DATA 0,81,64,0,81,64,0,81,64,0,81,
   64,0,81,64,0,85,80,0,85,80,0,0
670 GOTO 1920
690 POKE V,250:POKE 2040,9
   :POKE 2041,13
700 IF A$="END"THEN FOR N=1 TO 400
   :GET S$:NEXT:END
710 POKE 2040,14:FOR N=0 TO 62:READ A
   :POKE 704+N,A:NEXT
720 POKE V+1,KL:POKE V,250
730 POKE V+2,20:POKE V+3,KL
740 FOR N=0 TO 62:READ A:POKE 832+N,A
   NEXT:FOR T=20 TO 90:POKE V+2,T
   :NEXT
750 POKE V+3,KL:POKE V,250:POKE V+1,KL
760 POKE V,250:POKE V+2,90:POKE 2040,9
   :POKE 2041,13
770 EX=0:GOSUB 2680:IF PN>260 THEN GO
   SUB 2670:EX=1
780 IF DI<>0 THEN DI=0:GOSUB 2700
790 PRINT"▓▓▓SCORE ";S:GOTO 250
795 :
796 REM ALL FOLLOWING DATA NEED NOT
797 REM BE ENTERED EXCEPT LINE 9999
798 :
800 DATA SAMURI WARRIOR,14,250
```

```
810 DATA 13,208,0,13,100,0,7,213,0,1,
   64,0,10,160,0,10,160,0,10,168,0
820 DATA 42,170,0,42,170,128,42,182,
   128,42,173,128,42,187,0,42,224,0,
   170,224,0
830 DATA 171,168,0,174,168,0,174,168,
   0,186,168,0,234,168,0,208,16,0,21,
   21,0
840 DATA 13,208,0,13,100,0,7,213,0,1,
   64,0,10,160,0,10,160,0,10,160,0
850 DATA 41,112,0,41,255,255,41,112,0,
   42,128,0,42,128,0,42,160,0,170,160,
   0
860 DATA 170,168,0,170,168,0,170,168,
   0,170,168,0,170,168,0,16,16,0,21,
   21,0
940 DATA GLADIATOR,9,750
950 DATA 63,252,0,61,80,0,53,144,48,
   21,84,195,21,64,204,10,0,51,42,128,
   204
960 DATA 42,131,0,170,146,0,170,180,0,
   170,224,0,171,160,0,22,160,0,58,
   160,0
970 DATA 232,160,0,40,160,0,20,80,0,
   20,80,0,20,80,0,20,80,0,63,252,0
980 DATA 63,252,0,61,80,0,53,144,0,21,
   84,0,21,64,0,10,0,0,42,128,0
```

```
390 DATA 42,128,0,42,128,15,42,80,46,
   255,255,255,42,80,46,42,160,15,42.
   160,0
1000 DATA 40,160,0,40,160,0,20,80,0,
   20,80,0,20,80,0,20,80,0,63,252,0
1430 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■


         ";
1440 PRINT"■■■■"
1450 PRINT"■■_■ ■_■ ■_■ ■_■ ■_■
                ■ ■ ■ ■ ■

  .";
1460 PRINT"■■ ■_■ ■_■ ■_■ ■_■ ■
                ■_■_■_■_■

   ";
1470 PRINT"■┬─┬─┬─┬─┬─■
          ■■■■■■■■■";
1480 PRINT"■┬─┬─┬─┬─┬─■
          ■■■■■■■■■";
1490 PRINT"■┬─┬─┬─┬─┬─■
          ■■■■■■■■■";
1500 A$(1)="■┬─┬─┬─┬─┬■"
1510 A$(2)="■┬─┬─┬─┬─■"
1520 FOR N=1 TO 14 STEP 2
    PRINT A$(1);"
         ";A$(1);
1530 PRINT A$(2);"
          ";A$(2);:NEXT
1540 PRINT"■■─────────────────────
   ──────────────────";
1550 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■
   ──────────────────────────────"
1560 I$="■■■■■■■■■■■■■■■■■■■■"
1570 PRINT:PRINT"■■■■■■■■■■──── ────
   ─ ──── ──────── ─";
1580 W1$="■■■■■■■■■────── ───── ─
   ──── ─"
1590 W2$="■■■■■■■■■─────────────────
   ── ────"
1600 PRINT"■■■■■■■■■■■■■■■■■■

                    "
1610 PRINT"■■■■■■■■■

          '
1620 PRINT"■■■■■■■■■■■■■■■■■ ■■■    ■■■
   "
1630 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■■■■
                       ■■■■■■
1640 GOSUB 2530:PRINT"■■■SCORE:";S
1650 PRINT"■■■

                     ";
1660 PRINT"■
                     ";:POKE 2023,160
   :POKE 56295,0
1670 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■ENEMY
   ";A$
1680 PRINT"■■■SCORE:";S:RETURN
1690 PRINT"■■■"
```

```
1700 D$(1)="■■■■■■■■■■ ────
     "
1710 D$(2)="■■■■■■■■■■ ╱  ╲  ─ ─ ──
   ─  ─  "
1720 D$(3)="■■■■■■■■■■│■     ■╲ ╱╲╲ ╱╲╲│
   ╲ ╲ ╱╲╲ "
1730 D$(4)="■■■■■■■■■■│■       ■│■■│
   ■│■■■■│■ "
1740 D$(5)="■■■■■■■■■■│■ ■│■  ■│■■
   │■│■   │■ "
1750 D$(6)="■■■■■■■■■■│■ ■│■  ■│■■
   │■│■─╲│■ "
1760 D$(7)="■■■■■■■■■■│■ ■─╲■  ■│■■
   ■│■■■■│■ "
1770 D$(8)="■■■■■■■■■■│■       ■│■■─╲
   ■│■ ╲│■─╲"
1780 D$(9)="■■■■■■■■■■╲■     ■  ╲■   ■
   ■■■■ ╲■■■■":RETURN
1790 PRINT"■■■■":FOR T=1 TO 9
   PRINT D$(T);"■■■■■■■■■■";:NEXT T
   RETURN
1800 PRINT"■■■■■■■■■■           "
1810 PRINT"■■■■■■■■■■           "
1820 FOR N=1 TO 7:PRINT"■■■■■■■■■■


1890 RETURN
1900 RETURN
1920 IF Z$<>"SWORDMAN"THEN 1980
1930 KI=KI+1:Z$="":T$(KI)=TI$
   :TI$="000000"
1940 O=PEEK(V+3):FOR N=0 TO 213
   :POKE V+3,N:FOR T=1 TO 2:NEXT:NEXT
1950 W=100:GOSUB 2390:I=PEEK(V)
   :POKE 2040,9:FOR N=I TO 250
   :POKE V,N:NEXT:S=S+PN
1960 IF KI=3 THEN 2010
1970 TEX=0:GOSUB 2680:GOTO 750
1980 LV=LV-1:GOSUB 2530:GOSUB 2450
   :EX=0:GOSUB 2680
1990 O=PEEK(V+1):FOR N=0 TO 213 STEP 2
   :POKE V+1,N:GOSUB 2450:NEXT
   :IF LV=0 THEN 2120
2000 GOTO 750
2010 POKE V+21,0:PRINT"■"
2020 RM=RM-10:IF RM<10 THEN RM=10
2030 PRINT"■■■SCORE:";S
2040 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■■SCREE
   N BONUS:";BN;"":PRINT""
2050 PRINT"■":PRINT:FOR N=1 TO 3
   :PRINT"■■■■■■■■■WAVE";N;" TIME:";
2060 PRINT MID$(T$(N),4,1);":";
   RIGHT$(T$(N),2):PRINT:NEXT:S=S+BN
2070 GOSUB 2850
2080 PRINT"■■■SCORE:";S:KI=0:CB=CB-6
   :IF CB<=3 THEN CB=3
2090 READ A$,CL,PN:IF A$="END"THEN RUN
2100 GOSUB 1430:POKE V+21,3
   :POKE V+40,CL:BN=BN+1000
2110 GOTO 690
2120 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■
   ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■
2130 FOR N=1 TO LEN(L$)
   :PRINT MID$(L$,N,1);:FOR T=1 TO 200
   :NEXT:NEXT:FOR N=1 TO 1000:NEXT
2140 RUN
2150 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■■■PR
   ESS FIRE FOR GAME"
2160 FOR T=1 TO 1500:NEXT:GOTO 2560
2170 RUN
2390 POKE 54296,15
2400 FOR N=1 TO 5
2410 POKE 54277,129:POKE 54278,129
   :POKE 54276,65:POKE 54275,150
   :POKE 54274,150
2420 POKE 54273,H(N):POKE 54272,L(N)
2430 FOR T=1 TO W:NEXT
2440 POKE 54276,0:NEXT:RETURN
2450 POKE 54296,9
```

continued on page 59



BIG K charts

key

SP = Spectrum, AC = Acorn, 64 = Commodore 64, V20 = Vic 20, 81 = ZX 81, DR = Dragon 32, OR = Oric-1

TOP 30 GAMES (Retail)

				SP	AC	64	V20	81	DR	OR	Price
①	14	JET SET WILLY	Software Projects	★							£5.95
②	4	FIGHTER PILOT	Digital Integration	★							£7.95
③	3	ATIC ATAC	Ultimate	★							£5.50
④	2	MANIC MINER	Software Projects	★		★					£7.95
⑤	1	CHEQUERED FLAG	Psion	★							£6.95
⑥	9	HUNCHBACK	Ocean	★		★					£6.90
⑦	15	BLUE THUNDER	Richard Wilcox	★							£5.95
⑧	5	SCUBA DIVE	Durell	★		★					£6.95
⑨	16	POGO	Ocean	★							£5.90
⑩	7	ANT ATTACK	Quicksilva	★							£6.95
⑪	6	LUNAR JETMAN	Ultimate	★							£5.50
⑫	27	FRED	Quicksilva	★							£6.95
⑬	—	NIGHT GUNNER	Digital Integration	★							£6.95
⑭	8	FLIGHT SIMULATION	Psion	★							£7.95
⑮	—	CODE NAME MAT	Micromega	★							£6.95
⑯	—	ZAXXAN	Starzone	★							£5.95
⑰	—	REVENGE OF THE MUTANT CAMELS	Llamasoft			★					£7.50
⑱	—	SNOOKER	Visions	★	★	★					£8.95
⑲	19	THE HOBBIT	Melbourne House	★	★	★				★	£14.95
⑳	17	WHEELIE	Microsphere	★							£5.95
㉑	22	CHINESE JUGGLER	Ocean			★					£6.90
㉒	13	POOL	CDS	★							£5.95
㉓	28	THE SNOWMAN	Quicksilva	★							£6.95
㉔	10	SPACE SHUTTLE	Microdeal	★	★	★				★	£8.00
㉕	—	TRASHMAN	New Generation	★							£5.95
㉖	23	THE ALCHEMIST	Imagine	★							£5.50
㉗	—	TWIN KINGDOM VALLEY	Bug-Byte		★	★					£5.95
㉘	18	BUGABOO	Quicksilva	★		★					£7.95
㉙	—	DEFENDA	Interstellar	★							£5.95
㉚	12	STONKERS	Imagine	★							£5.50

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VIDEO GAMES (Dedicated Consoles)

①	(1)	POLE POSITION (Atari)
②	(3)	SPACE SHUTTLE (Activision)
③	(2)	SUPER COBRA (Parker)
④	(—)	PITFALL 2 (Activision)
⑤	(8)	MARIO BROTHERS (Atari)
⑥	(4)	POPEYE (Parker)
⑦	(25)	MS PAC-MAN (Atari)
⑧	(5)	ENDURO (Activision)
⑨	(7)	DEATH STAR BATTLE (Parker)
⑩	(6)	Q-BERT (Parker)
⑪	(—)	FROSTBITE (Activision)
⑫	(19)	GALAXIAN (Atari)
⑬	(—)	PHOENIX (Atari)
⑭	(12)	BATTLE ZONE (Atari)
⑮	(11)	FROGGER (Parker)
⑯	(14)	DONKEY KONG (CBS/Coleco)
⑰	(13)	SNOOPY VS THE RED BARON (Atari)
⑱	(9)	DIG DUG (Atari)
⑲	(10)	MOON PATROL (Atari)
㉑	(15)	PITFALL (Activision)
㉑	(21)	PAC-MAN (Atari)
㉒	(18)	BIG BIRD EGG CATCH (Atari)
㉓	(16)	RIVER RAID (Activision)
㉔	(17)	TUTANKHAM (Parker)
㉕	(24)	COOKIE MONSTER MUNCH (Atari)
㉖	(29)	SPACE INVADERS (Atari)
㉗	(20)	JUNGLE HUNT (Atari)
㉘	(27)	CENTIPEDE (Atari)
㉙	(22)	SMURFS (CBS/Coleco)
㉚	(30)	ROBOT TANK (Activision)

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THE FOREST
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FLYING FEATHERS
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KRAKATOA
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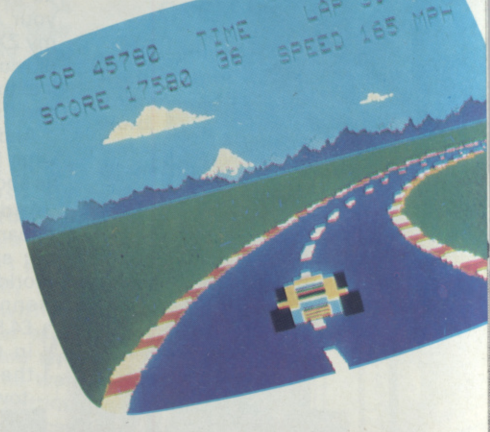
TOP 45780
TIME 36
LAP 39"00
SCORE 17580
SPEED 165 MPH

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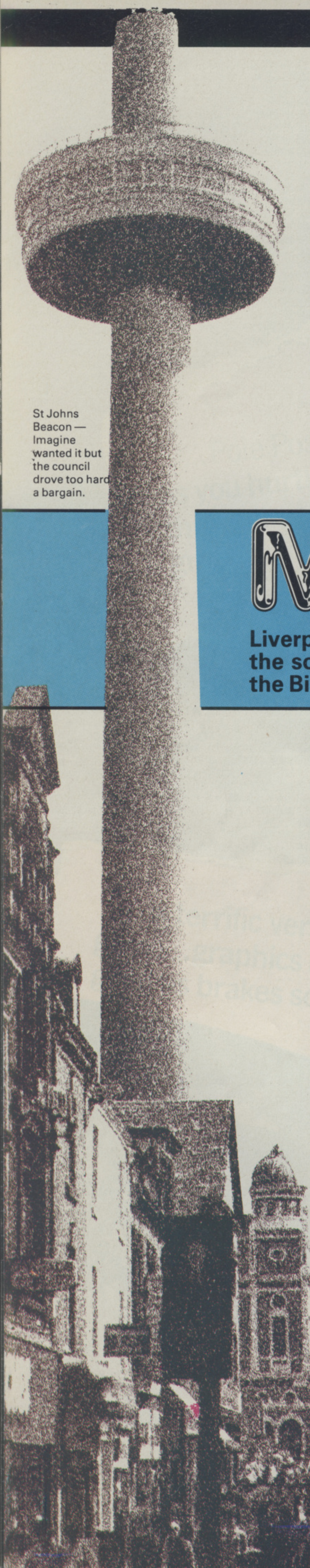


St Johns Beacon — Imagine wanted it but the council drove too hard a bargain.

IT MAY seem a long time ago now, but in 1964 there seemed to be quite a lot going for the city of Liverpool.

I'm not talking about the city itself. As someone who grew up there I remained convinced that Liverpool was, and most likely still is, a dump of the first magnitude (but we won't go into that). What I'm referring to is the famous explosion of pop (we still called it 'pop') talent, which twenty years ago immediately characterised the 'Pool as a city with a talent for the unexpected — just as everybody else, me included, was writing it off.

These days we find the great and gungy city beside the fair-flowing Mersey (a river with its own very special breed of Goldfish) once more visibly down on its luck. Unemployment, always high, is now critical. The city council are at loggerheads (not half) with Westminster. By the time you read this Liverpool may be officially bankrupt. It's a gloomy picture.

Except for one small thing. From the smouldering ash-heaps of Liverpool 8 a strange, alien, multicoloured tendril is creeping. And another! And two more! They pulse in glowing electronic waves but are clearly thriving, growing fast. There is an eerie tweeting sound and one can see bundles of banknotes clutched in Venus Fly Trap-like mandibles. The earth begins to vibrate.

No! No! It's . . . it's . . . *Software!*

And how.

Although there are at least half a dozen games designing operations now under way in Liverpool, this report concentrates on only the three biggest: the uneasy legs of a single tripod (assuming you like metaphors). They are *Bug-Byte,* the original Liverpool games company and the wellspring of the other two; *Imagine,* who need no introduction from me; and the newest of the three, *Software Projects,* formed out of breakaways from the first two, while the second had itself been formed by people breaking away from the first. There is, in a word, a close causal relationship between the three Merseyside games companies, but despite this, they don't appear to like each other very much. There are dark sayings, and unorthodox doings up there beside the Mersey; and even darker rumours. Yet with all the Borgia-style betrayals and poisoning of each others' soup, there is still a lot to be proud of.

MERSEY BYTE!

Liverpool — where the echoes of the Mersey Beat sixties have given way to the sound of machine code. TONY TYLER returns to his roots to check out the Big Three in 'Scousesoft'. . .

Bug-Byt
Tony
Baden

WHEN THE BUG BIT BACK

IN THE beginning there was Bug-Byte.

Well, actually, in the *real* beginning there was University College, Oxford, and within those dreamlike portals there was Tony Baden and Tony Milner, reading Chemistry.

And lo, on a day the man Baden said to the man Milner, I have an idea, Tone, and the man Milner said, Shoot, Tone; whereby the man Baden said, let us go into the world, you with your Acorn Atom and me with my ZX80 and make a great deal of money, for verily, I have had it to the teeth with the Stinks Lab and these ridiculous gowns.

And the man Milner said, just what I was thinking, Tone; and he spoke the truth.

And on a day these two departed the city of the dreaming spires and went into the world with a total capital of a tenner; whereof they spent £4.50 on a single classified ad in *Computing Today,* and they chose Baden's home town Liverpool as their base, and all was gladness, for the orders came pouring in.

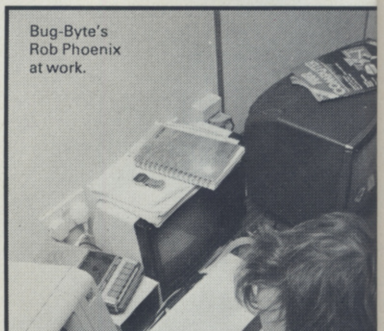
Well, it was more or less like that. The names are true, as is the capital of £10.00, and the Atom and the ZX80 — as was the fact that in those days (May 1980) Bug-Byte had no duplicating facilities, so that each mail-order requirement meant a SAVE routine.

Throughout their first year Mail Order was the name of the game, with the two roles gradually coalescing into Milner (the programmer) and Baden (the marketing man). Throughout 1981 they took on staff, man by man; and apart from occassional hiccups — almost all of these of a personal rather than product kind — they just grew and grew, like many another software company during the previous two or three years. Their first real hit was *Mazogs* for ZX81 (written by Don Priestly, now with DK'tronics), and — unusually — they were into Utilities quite early on too, with editors / assemblers / disassemblers and the like all available. And *Spectrum Invaders* came along to swell the coffers, as did *Spectres,* designed by one Dave Lawson.

UPWARDS AND OUTWARDS

Within a year of this they had severly outgrown their original office, so they hight themselves to Canning Place, anent the docks. Forty-five Big Ones into the fitting out of what was now Liverpool's largest and fastest-growing software house; and at the same time, bearing in mind all those SAVEs, they inaugurated Spool, their own duplication company. Down came their overheads in a rush, while up went their productivity.

Star programmer Dave Lawson left in July 1982 — rather



Bug-Byte's Rob Phoenix at work.

unexpectedly, one gathers. Two months later Mark Butler, another Bug-Byte programmer, had followed Lawson (which puzzled Baden at the time, since in his estimation Butler had harboured unkind thoughts about Lawson); and the first, and greatest of Bug-Byte's rivals had appeared: Imagine Software. At about the same time the bespectacled author of *Panic* departed as well, and in the same direction.

EXIT THE MINER

Bug-Byte faltered slightly at this sudden loss of talent, but recovered swiftly. By the following April they had yet another potential star working for them on a freelance basis: Matthew Smith. Smith's first effort for Bug-Byte was *Styx*, which all sides admit bombed out. And then Smith produced *Manic Miner*.

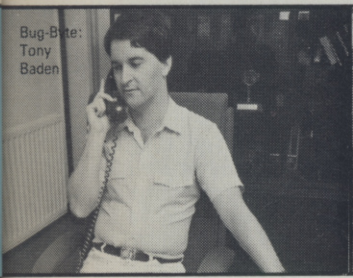
More aggro surrounds this game, seemingly, than attends US-Soviet relations. There are claims and counter-claims, all exacerbated by the fact that Matthew Smith has of course now also left Bug-Byte, and is one-third of the newest company, Software Projects. He having taken the rights to *Manic Miner* with him, the same game has now been in the charts under *two* labels: old and new. This is a unique situation, and has been attended by angry comments from both sides.

"I know what Matthew's been saying, that he didn't get enough from *Manic Miner*," says Baden. "But I can tell you he got £50,000 cash from that one game while we sold it, and if that isn't enough, I'd like to know what is."

How was freelancer Smith able to take the Miner with him? Hadn't he signed the old boy away? "There was a clause in our original contract," explained Baden, "which, due to a comma in the wrong place, or a missing comma, can't remember which, was a bit ambiguous. Rather than spend a lot of time and money fighting it in court, we agreed to let him take the game with him. At the time, you see, Matthew was a minor, and our legal people told us that against a minor in open court nobody has a chance."

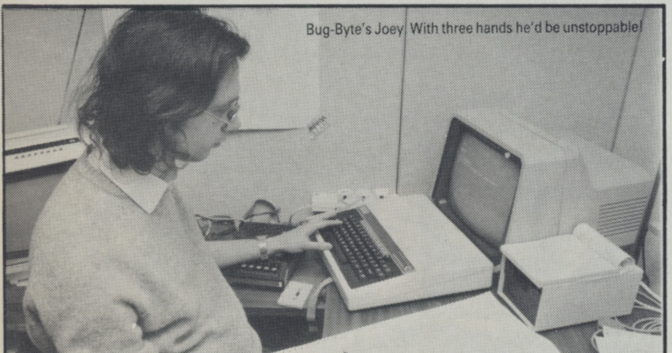
Baden is "neutral" about the idea of more and more software operations setting up house in Liverpool. He also carefully avoids negative feelings concerning Imagine and SP, as far as he can.

The first of all the 'PoolSoft houses has now recovered from the 'Manic Minor' affair, as they have from other affairs, and with Trevor Hall now spearheading their active teams, are continually developing new and high-quality software. At the time of writing, the *Computer Cookbook* is being launched — an obvious way to get all those legendary housewives hooked. Imminent: *The Birds and the Bees* (not what you think), and now *Antics*, written by 17-year-old Adrian Sherwin. Bug-Byte have what they call MegaGames in the pipeline, chiefly *Star Trader*, which they call an 'ArcVenture'. They "might" support Enterprise and Amstrad ("Depends how they sell") and will "probably" support the QL.


Bug-Byte: Tony Baden

Software Projects: Colin Stokes, Sue Maton, [illegible] Maton

Imagine: Eugene Evans (at keys), Mike Glover


Bug-Byte's Joey. With three hands he'd be unstoppable!

FERRARI 'CROSS THE MERSEY

IF IMAGINE didn't exist, somebody would have to invent them.

This company has a national — never mind local — image as wide as a barn door. *Flamboyant* is a fair description. They have more than halfway succeeded in making themselves into minor national figures. One of the founder-directors rides a 170 mph superbike and has serious ambitions concerning the Isle of Man TT. Eugene Evans is the boy-wonder programmer even the *Daily Telegraph* has heard of. And, parked all over yellow lines outside the company's business-district offices, is a constantly rotating assortment of fast and expensive status symbols of the four-wheeled kind: an Aston; a BMW or two; the world-famous Lotus Espirit belonging to the scarcely less renowned Eugene Evans.

They also make very good computer games and earn a lot of money from them. Why the blue blazes shouldn't they do what they like with their dough? (I would.) So what if their Operations Director is, in his manner, a dead ringer for JR Ewing? Like the fictional oil-rich Texas executive, he gets things done and is not exactly (verbally) slow on the draw. In this he's like everybody you meet at Imagine. They all have total confidence in their corporate future; they feel they're going places.

SECRETIVE

They are also (to use an old hippy word) *misterioso*. By which I mean there's a lot of "No, you can't point a camera over there" and "You mustn't go in that room". Fiddling idly (but closely supervised) with a MacIntosh, your reporter accidentally accessed a menu and felt very strongly that he was within a nanosecond of getting his fingers rapped. Stern notices inhabit the walls ("These machines have been put here by Dave Lawson and MUST NOT BE TOUCHED"). Getting into Imagine is also not easy, due to the electronic security system.

This is all to protect their work, which on the face of it seems reasonable enough. Imagine have their own so-called MegaGames in a secret, near-finished state (on these, more in a moment). They dislike inaccurate press speculation but themselves do little to help. They are surrounded by rumour.

THE 'A' TEAM

The company was formed slightly less than two years ago by two former Bug-Byte employees, programmers Dave Lawson and Mark Butler. They were shortly afterwards joined by a third, younger Bug-Byte programmer, Eugene Evans, but for unexplained reasons Evans was never invited to sit on the Board and remains a jobbing, if senior, games designer. Since then Imagine have barely looked back. Growth has been staggering — among their many satisfying hits being Evans' own *Arcadia* for Spectrum (and now 64), a ground-based shoot-'em-down with undeniably classic overtones. It has sold hundreds of thousands of copies.

There are more recent hits. Ian Weatherburn's *Alchemist* is a remarkable and again definitive piece of work, an 'ArcVenture' with nifty subroutines and a killing pace. And John Gibson, oldest of Imagine's 'A Team', has recently produced a classy miniaturised strategic wargame, *Stonkers*. The upcoming MegaGames ("We've found a way of very considerably enhancing the power of the personal computer" — Bruce Everiss) are code-named *Psyclapse* and *Bandersnatch*.

OPEN SPACES

Their offices — formerly of an Arab shipping line — are immense; the only possible word. Seemingly hundreds of feet apart — a stiff walk away — sit the programmers in teams of

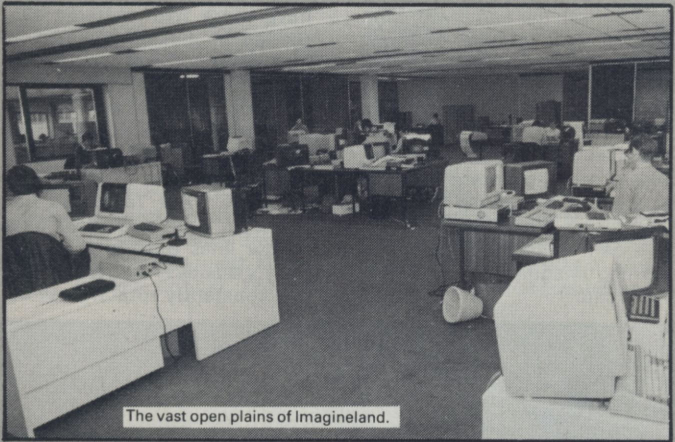
Anonymous Imagine programmer.

Imagine's in-house 'orchestra'.

two, say, Evans and a junior hacker, each with a neat desk, a Sage IV, a couple of monitors and a Commodore 64. Many of the offices have glass walls.

BIKER, THE RAT & JR

Today, as on many days, Mark Butler is dressed for biking; leather jacket, scarf, chunky boots, as is fellow-director Ian Hetherington, the only one of the junta of four to refuse to appear on the TV cameras (Channel 4 are present, making a film). Operations Director Bruce Everiss wears (was probably born wearing) suit and tie. Dave Lawson — according to Butler the man 'who made it all happen' — is small and neat and moustached like Kenneth Grahame's Water Rat, and speaks so quietly people lean in from either side to hear him talk.



The vast open plains of Imagineland.

During their TV interview these three, Lawson, Everiss and Butler, reinforce their company's image again and again — optimistic about the future, superconfident about their own fortunes, scathing about Liverpool City Council (you didn't hear this bit on TV).

Imagine don't get on too well with the Council, who, they say, positively discourage new investment; which is why Imagine don't see new Silicon Valleys springing up all over Merseyside. The latest of their run-ins with the Labour council has, it must be admitted, its farcical side. Apparently Imagine approached Derek Hatton and his Militant boys with a view to leasing the now-defunct revolving restaurant atop St George's Beacon, which is the 'Pool's equivalent of the Post Office Tower. There were even plans, it is said, to display the Imagine logo from on high in the form of a giant neon sign.

The Council said, OK, give us a piece of the action and we'll oblige.

What, said Imagine. Do you mean a proportion of our *company profits*?

Too right, said the Council. A *large* portion.

Forget it, said Imagine. And they have.

Imagine's directors know they are not well liked within the Liverpool software ghetto. Nor do they give a toss, one gathers. They show no mercy and ask none. One of the more extraordinary of their actions took place shortly before this article was written, when the company not only *bugged* a senior employee they suspected of preparing to defect, but also actually *released* a transcript of an alleged treacherous conversation and published it as a broadsheet given away free with the normal monthly issue of a trade magazine. (The magazine owners caught on after 30,000 issues had been printed and pulled the plug.) The bugged employee has since left and now works for Software Projects — though Imagine itself, remember, was formed by former Bug-Byte men who also defected at a critical and (for the host company) highly inconvenient moment. It's not all fun and games and multi-coloured character sets, up there in Liverpool.

TALES OF THE MANIC MINOR

AND THEN there was Software Projects.

This time the ancestry is even more muddled.

Matthew Smith we know about. Then there was Alan Maton, former Dispatch Manager with — you guessed it — Bug-Byte. And there was another executive, Colin Roach, who was working at the time for Imagine, firstborn sons of Bug-Byte.

Maton was "not too happy" at Bug-Byte at about this time last year, he remembers. Restless and — he felt — under-employed, he cast around for a new billet.

At the same time or slightly later Matthew Smith, a Bug-Byte (freelance) programmer, began to think himself under-valued, and also began feeling restless.

A businessman, slightly known to Maton, had a son who was keen on this computer stuff. After a one-hour discussion, in which Maton opened the man's eyes with visions of glory and dollars, the wealthy fellow offered Maton a partnership; which he at first refused, then accepted — on condition that Matthew Smith be made the third partner. Smith duly assented, they both quit Bug-Byte (as usual in these cases, rather suddenly), and the following Monday Software Projects was in existence, with an address in the pleasant middle-class suburb of Woolton, Paul McCartney's old manor.

In addition to bringing the rights to his game *Manic Miner* with him from Bug-Byte, Smith, after a longish delay for final polishing, produced another masterpiece, *Jet Set Willy;* a fast and colourful game known above all for the bizarre quality of its collectable objects. Its chart showings (as good as you can get) have immediately established the third Liverpool software house as a rival in every sense to its begetters. The company could hardly have enjoyed a better start.

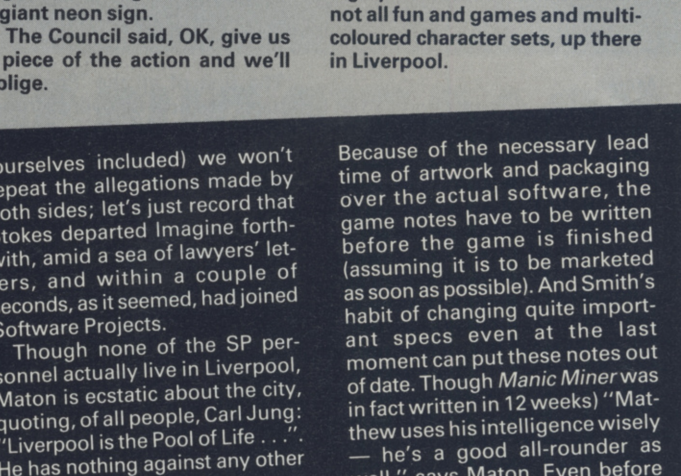
Two months ago (at time of writing) the Trade (that's us, and them, but not You) reeled with amazement when Imagine circulated the script of an alleged phone conversation involving their employee Colin Stokes, a senior sales exec. It seems that, suspecting him of disloyalty, they had tapped his telephone.

To save everybody trouble (ourselves included) we won't repeat the allegations made by both sides; let's just record that Stokes departed Imagine forthwith, amid a sea of lawyers' letters, and within a couple of seconds, as it seemed, had joined Software Projects.

Though none of the SP personnel actually live in Liverpool, Maton is ecstatic about the city, quoting, of all people, Carl Jung: "Liverpool is the Pool of Life . . .". He has nothing against any other company and remains a personal friend of Tony Milner, co-founder of Bug-Byte.

The company is TRS-80 based, following Smith's own route into computers. (they actually use the big Model 3's.) Smith, according to Maton, is a brilliant but sometimes whimsical perfectionist. Because of the necessary lead time of artwork and packaging over the actual software, the game notes have to be written before the game is finished (assuming it is to be marketed as soon as possible). And Smith's habit of changing quite important specs even at the last moment can put these notes out of date. Though *Manic Miner* was in fact written in 12 weeks) "Mathew uses his intelligence wisely — he's a good all-rounder as well," says Maton. Even before joining Bug-Byte, at 17, Matthew Smith had been running his own company (with his mother as Managing Director), writing and selling small business packs for the TRS-80.

Those were the days. What comes next?



Software Projects programmer John Darnell.

the LLAMA has LANDED!

...... and it's breeding fast.

Once upon a time, only Commodore owners could experience the thrill of playing an original game by Jeff 'Awesome' Minter. Lesser mortals could only sit and stare in wonderous rapture at the furry arcade action brought to you by Llamasoft.

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This classic arcade game, originally developed by Jeff 'Awesome' Minter of Llamasoft, features 1 and 2 player options, spitting Llamas, Cyborg Arachnid Mutants, Disgusting Weeviloids, 99 levels of play. Joystick recommended. Supports Spectrum ZX Interface 2 and Kempston joysticks.

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Game originally developed by Jeff 'Awesome' Minter of Llamasoft. Joystick recommended. Supports Kempston and AGF joystick interfaces.

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MAN IN THE CROWD

LIKE HIS CONTEMPORARIES of the sixties, Liverpool-based Mike Singleton has turned his back on the Scouse House in favour of the bright lights of London-based Beyond Software. Through them he has unleashed his 'Epic' fantasy game *The Lords of Midnight*.

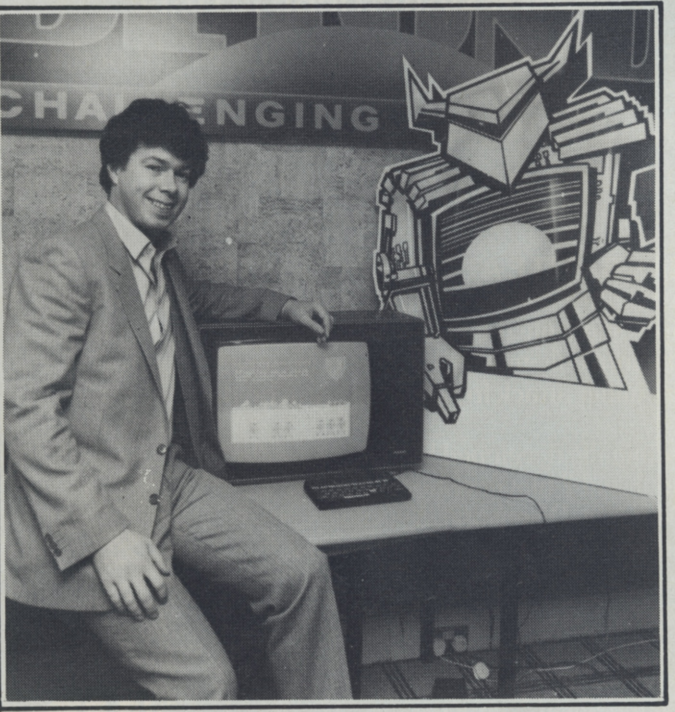
Mike has a dictionary. He has looked up the word epic. "It describes crucial events in the history of a nation," he says. Well, that's part of it. In BIG K's dictionary it means something on a pretty large scale — and that just about sums up Mike's approach to writing computer games.

Mike started off in a 'small' way with *Starlord*, a play-by-mail game that just growed and growed. After the 500th player had joined the game Mike decided that it was time to give up his teaching job to concentrate on running *Starlord*, along with a few other projects he had in mind.

CROWD SCENES

But like a Sir Richard Attenborough of the software world Mike is capable of things other than heavy crowd scenes. He's had his moments with the odd arcade style game or two. *Snake Pit, Shadowfax, 3 Deep Space* (the one that made your eyes go funny) are all his. Now he's going for the Big One.

The Lords of Midnight is difficult to tag. Beyond Software seem overly fond of the term 'Epic' when describing it. More accurately it could be termed an interactive multiplayer computer game utilising adventure and wargaming themes (mmm, maybe 'Epic' is a little shorter). It can be played as a traditional quest, a tactical wargame or a generally impressive trip through some advanced computer graphics.



Singleton by name but not by nature. MIKE SINGLETON, master of the multi-player game, is the man behind those enigmatic ads — "Who Are The Lords of Midnight?" RICHARD BURTON talks to another scion of the Liverpool software boom.

It is these graphics that are a key to the whole game. Mike has come up with a process he calls 'landscaping' which, every time you move, will redraw the landscape around you in proper perspective, making any changes necessary. As you move forward distant peaks will resolve into mountain ranges, with forests and castles if need be. Lakes, frozen wastes, villages, citadels, armies and other elements can be added or taken away as required — all are random. Beyond claim a staggering total of 32,000 different locations for the game.

This is important because the player views the scene through the eyes of the main character, Luxor, and three others (as well as a possible 32 others, but that's another story). Each can be in a different part of the Land of Midnight thus giving an ever-changing number of viewpoints.

Game objective, *very* simply, is to defeat the evil Doomdark, played by the computer (gimme a hiss, gimme a boo). You are the hero, Luxor the Moonprince, Lord of the Free (gimme a yay, gimme a rah) and, by virtue of the Moon Ring, you can control other characters that are loyal to you. You can move them through the realm of Midnight and see through their eyes. Some are individuals, some commanders of armies — you get the army thrown in.

There are two methods of offing Doomdark and his hordes: the wargaming method of sending armies to capture his citadel or the adventure method of sending one character off on a quest to locate the Ice Crown, source of Doomdark's power. You can tackle each of these separately or together to form the complete 'Epic' game.

The Lords of Midnight is a very complex interactive game which requires far more space than is available here to fully explore all its features — besides we're looking forward to giving it a full review very soon. So, you might think, such a game must've been some time in the making. Not so.

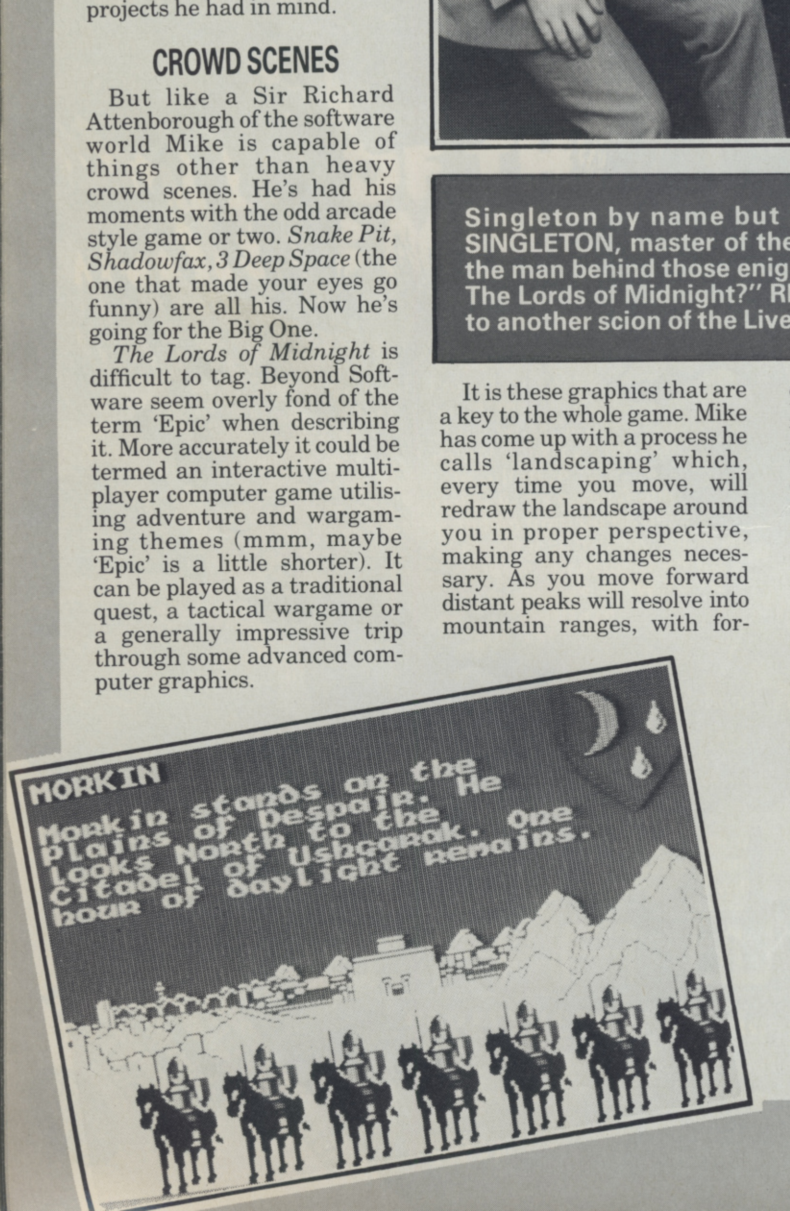
According to Mike it all began to come together towards the end of last year. Perfecting the 'landscaping' routine was the cornerstone of the project. In September Mike brought the idea to Beyond's Terry Pratt.

The next major steps were the establishment of the map of the Land of Midnight and the story which forms a prelude to the game, both of which appear in the game's manual. "I tried not to be influenced by Tolkien," said Mike, "but some aspects of his work were bound to creep in, as in most other fantasy-based games."

Work proper on the programming started only in January of this year and was 99 per cent complete within three months — not bad going when you consider how much has been packed in the Spectrum's memory.

Comparisons with 'super adventures' *The Hobbit* and *Valhalla* are bound to be drawn so BIG K anticipated the debate by asking Mike his thoughts on adventure games in general.

"I'm not really an adventure games player," he openly admitted. "I came into computer gaming through wargames. I find most adventure games to be 'closed', allowing only one possible route to completion. *The Lords of Midnight* is an 'open' game using intelligent play by the computer. Routes aren't dictated by the programmer in advance nor is all the scenery preplanned and locked into the computer's memory. You are in control of the main characters and their ultimate destiny."



MORKIN

Morkin stands on the Plains of Despair. He looks North to the Citadel of Ushgarak. One hour of daylight remains.

Driller Tanks
Zipper Flipper
Stop The Express
Eric & the Floaters
Bubble Buster

A fine day for tennis on your Spectrum

This is Wimbledon.

The home of British tennis, enjoying Britain's fine weather.

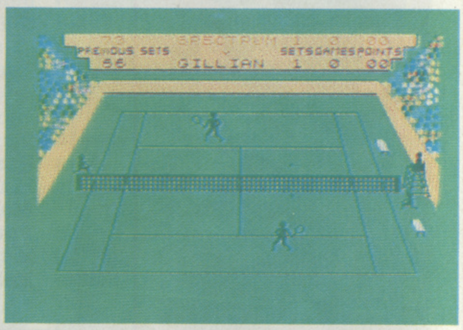
But this summer, things will be different. If rain stops play on court, you'll be able to carry on playing – with Sinclair's 'Match Point'.

'Match Point' is one of six new, all-action programs for your Spectrum. It lets you play tennis against the computer, a friend, or just sit back and watch an exhibition match.

Enjoy all the features of tennis – backhand and forehand shots, lobs, drop-shots, volleys, a scoreboard... even ball boys are on-call.

But good tennis strokes aren't everything. To win the Match Point Open Championship you'll need skill *and* tactics.

Luckily, though, you won't have to rely on the weather!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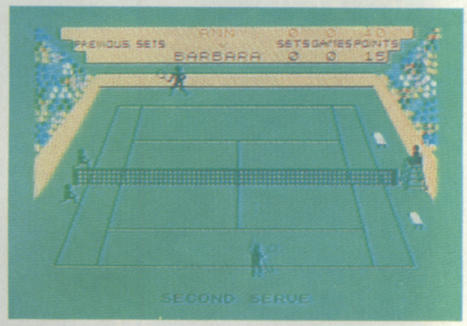
ANN 0 0 40
PREVIOUS SETS
SETS GAMES POINTS
BARBARA 0 0 15
SECOND SERVE

'Match Point' has been developed by Psion, one of the UK's top software houses.

You'll find it alongside Sinclair's other new titles – Stop the Express, Bubble Buster, Zipper Flipper, Eric and the Floaters and Driller Tanks – in the shops, today.

At £7.95, it's a real winner!

Selected Sinclair software lines are available from W.H. Smith computer stores, larger branches of Boots, John Menzies, Greens and most other software stockists nationwide.

Sinclair Research Ltd, Camberley (0276) 685311.

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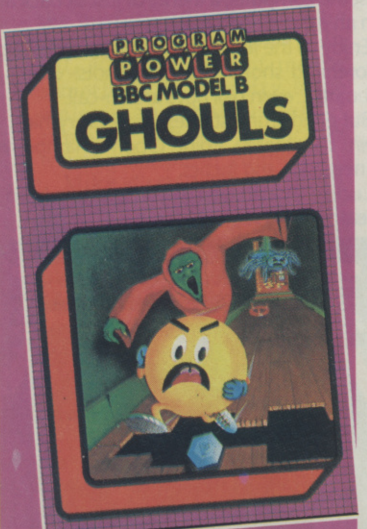
sinclair

K = Could Be Better
KK = Could Be Worse
KKK = Unsurpassable

RAVE from the GRAVE

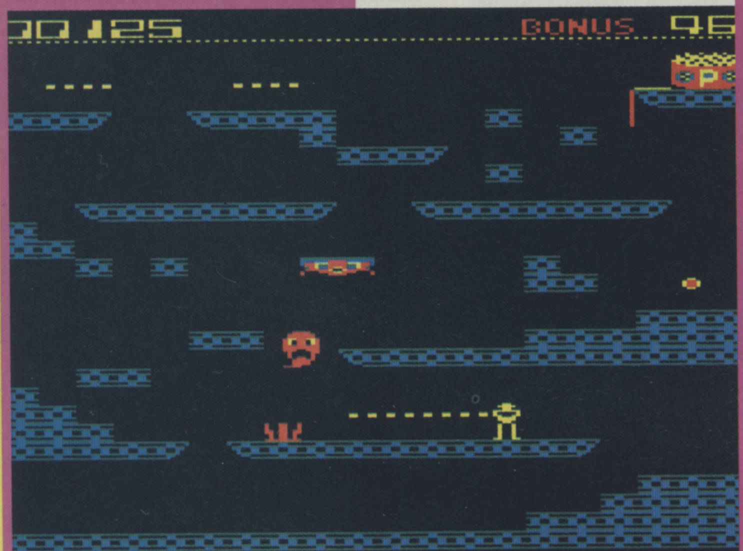


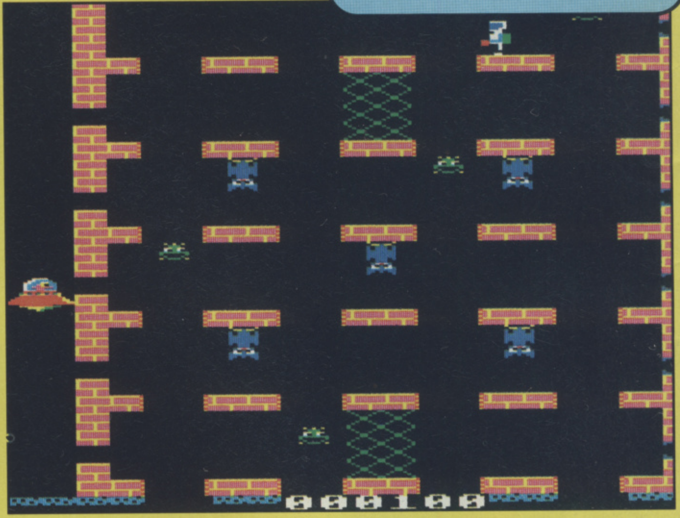
Remember *Killer Gorilla?* Well *Ghouls* is better. In fact it's probably the best game I've seen for the BBC. The graphics are superb, the sound marvellous and above all it made me laugh. It's full of nice touches that give it a real professional feel. You even have the option of music while the game is loaded and the screen change between levels has to be seen to be believed.

Ghouls is set in a haunted mansion and you have to run through four rooms in the house, avoiding poisonous spikes, bouncing spiders and contracting floorboards to rescue the power jewels. All this is accompanied by spooky background noises and if you lose a life something suspiciously like ghostly laughter floats from the loudspeaker. There are four rooms in all and each one is packed with features. You can bounce off springs, travel along moving platforms and leap onto sliding floors. There's so much going on it's unlikely you will lose interest for some time.

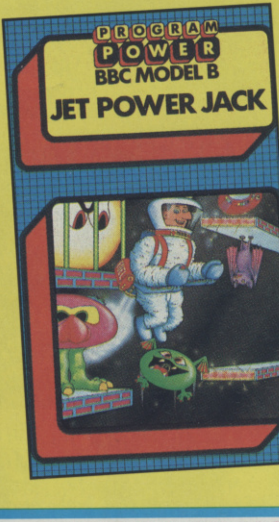
An original idea beautifully implemented and an absolute must for any games shelf. — **K.A.**

Game: GHOULS
Maker: MICRO POWER
Machine: BBC
Format: cassette
Price: £7.95
Rating: KKK





This Jack's Alright



Nasty doesn't even begin to describe *Jet Power Jack*. Only an hour at the keys and I was reduced to a slobbering wreck who had to be physically restrained from putting a boot through the screen. It's one of those games where you control a little man with a jet pack. Poor old Jack has been caught by Nogrob the Terrible and unceremoniously dumped in a space garage.

You have controls for left, right and thrust to go up and you manoeuvre him around, avoiding the ever vigilant Space Googjies, picking up fuel pods to take back to his spaceship. Sounds easy? Not a bit of it. The walls are all electrified and touching them means instant incineration. You also have very little room to move around in and this makes it an absolute nightmare. I spent hours smashing the unfortunate Jack into walls until I finally gave up.

Unless you're a hardened games freak, used to scores like telephone numbers then keep a strait-jacket handy. — **K.A.**

Game: JET POWER JACK
Maker: PROGRAM POWER
Machine: BBC
Format: cassette
Price: £7.95
Rating: KK

TROOPA TRUCK

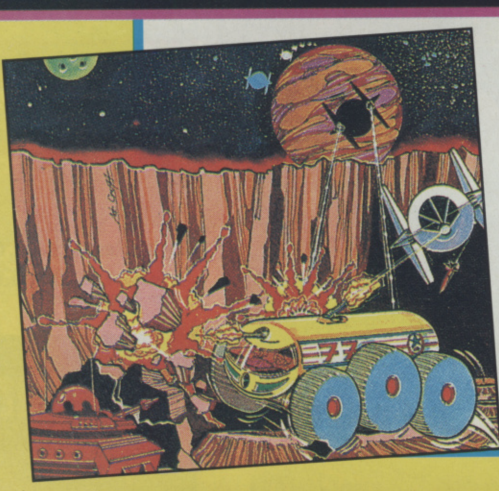
Whoever invented *Troopa Truck* should be put in a truck of his own design, taken out into the desert, and dumped. Never has a game infuriated so much by so few attempts to play it.

Let's start with the action. You are a truck. Like in the popular arcade games you have to move across the screen, blastin' boulders and jumpin' over any obstacles in your path. You are also plagued by airborne craft which must be elimiated before they blow holes in your way. It quickly became apparent to me that if I held down the fire button continuously, I could simultaneously eliminate the boulders and the flying craft. So there I lurked, never using any speed so that I could see what was coming. That's it. You carry on, sweaty mitt on button, until you get zapped, which you always do. For some obstacles are simply insurmountable. So you fall victim and the performance starts all over again.

Good points: When the truck is destroyed, the chassis collapses and sinks to the ground. The wheels fall off and scatter, making a rippingly good 'churning-scrunch' sound. The truck noise itself is really great — sounds just like the brisk clip-clop of a horse. (Though Thrang knows why a truck wants to sound like a horse.)

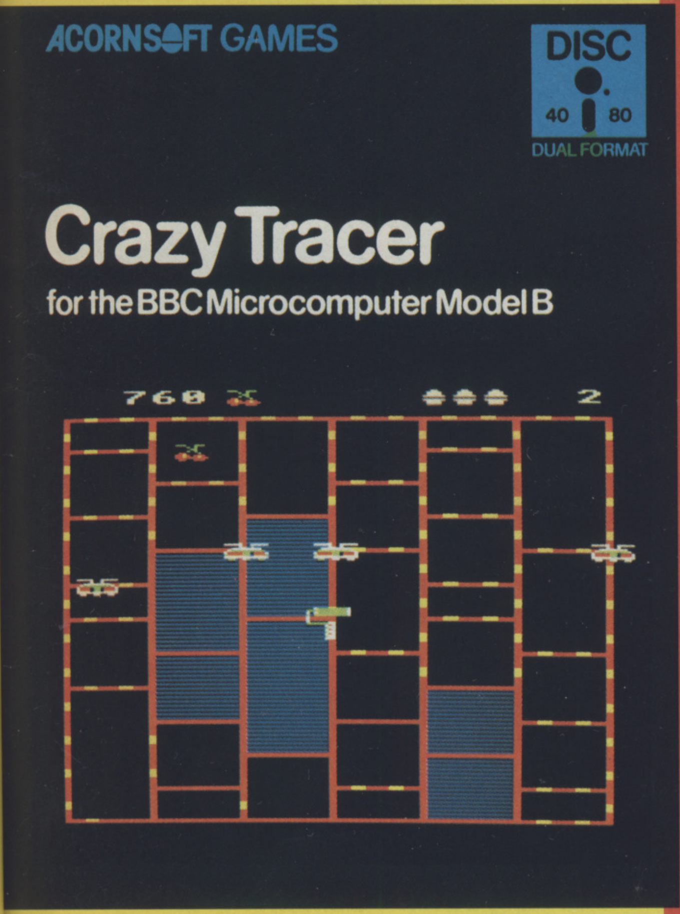
All this joy crystallises against a background as eyecatching as a plate full of mud. Flat layers of colour form a landscape designed by a kindergarden impressionist. If I could spell what a raspberry sounds like, I'd blow one here. — **N.X.**

Game: TROOPA TRUCK
Maker: RABBIT
Machine: COMMODORE 64
Format: cassette
Price: £5.99
Rating: K



Reviewers

STEVE KEATON
NICKY XIKLUNA
TREVOR SPALL
KIM ALDIS
TONY TYLER
RICHARD BURTON
RICHARD COOK



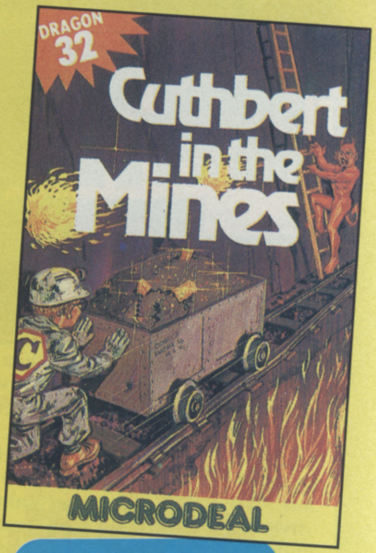
Acorn can usually be relied on to produce good versions of classic games and this is no exception. *Crazy Tracer* is a copy of the excellent *Painter*.

You have to guide a paint roller around squares while avoiding monsters intent on flattening the roller. There are two different screens which alternate with each other. On the first you have to trace round each square which fills in when completely surrounded. The second is more difficult. You can only fill squares adjacent to ones already filled. If you change direction or move away from the square the roller runs out of paint and you have to go back to a completed square for a refill.

Extra lives are awarded for every 10,000 points scored and you can make the monsters jump if you get caught in a desperate situation. You also get bonus points for filling squares containing fruit.

Crazy Tracer has all the addictive qualities of games like *Pac-Man*. Basically simple and yet totally absorbing. — **K.A.**

Game: CRAZY TRACER
Maker: ACORNSOFT
Machine: BBC
Format: cassette or disc
Price: £9.95 (cassette)
£11.50 (disc)
Rating: KK



MAKE MINE CUTHBERT

The continuing saga of *Cuthbert* reveals Microdeal's hero/victim to be trapped underground, his ambition (and, of course, yours) being to reach the surface. Cuthbert needs to jump up five levels along which trundle sets of trucks as obstacles to be avoided. Cuthbert must jump into the gaps if he is not to be knocked down to the level below. The bottom of the screen is a fiery pit which means the end of Cuthbert should he fall too far. To complicate matters a demon patrols a ladder spitting fiery death should he spot Cuthbert on a level.

Cuthbert has four 'lives' ("we can rebuild him, we have the technology") and you can use either the joystick or the arrow keys to guide to the single surface exit. Eight escapes means promotion to the next screen. There are five of these, ranging from 'easy' to 'impossible'. You can select which screen to start at, a feature which I feel should be the norm rather than the exception.

The graphics are good with Cuthbert response is quick and all the game sound have been well thought out an executed. Presentation includes a demonstration mode and a high score table is provided for those of you who are good enough to get on it. All in all, a thoroughly addictive fun game.

One *minor* (had to get it in) niggle: why does the documentation entitle the program 'Cuthbert in the Mines' when the title page on-screen declares 'Cuthbert in the Mine'? Does Microdeal know something about NCB policy that we don't? — **T.S.**

Game: CUTHBERT IN THE MINES
Maker: MICRODEAL
Machine: DRAGON 32
Format: cassette
Price: £8.00
Rating: KK

FLAP, FLAP, *SPLAT!*

Flying Feathers is an X-rated game for animal lovers. Imagine: it's a beautiful summer's day. You sit in a rustic rowing boat on a calm lake. Distant fields can be viewed, stretching out like Mother Goose's patchwork quilt over the horizon. Suddenly, the brilliant blue sky fills with birds. So you shoot them. Flap, flap, splat!

But you're only doing your job. You're a game warden with a shotgun, and you gotta git them critters afore they swoops durn an' gits yur fish.

A solidly-crafted, addictive game this. Very attractive hi-res graphics. A madly quaking duck bolts across the lake if you manage to aquire a bonus fish. There's even a theme tune that I actually hadn't heard before — not just another well worn music-hall favourite. Well worth a thrash — but strictly not for the birds. — **N.X.**

Game: FLYING FEATHERS
Maker: BUBBLE BUS
Machine: COMMODORE 64
Format: cassette
Price: £6.99
Rating: KK

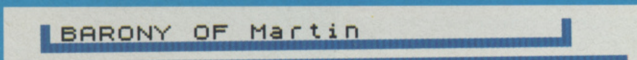
Down with the Peasants!

A worthwile strategy game idea is deflated by an exceedingly tame format. Like Temptation's other games the graphics operate at subsistence level in this simulation, where up to four players (the solitaire version is hopelessly dull) tussle to be top baron in a feudal environment. Feed workers, hire mercenaries, plant crops or attack other holdings in scenarios that range between 5 to 50 moves according to your boredom threshold.

My threshold came in very low when I realised how soporifically functional the text was and how youhave to conduct baronly affairs like Attila The Hun to inject any life into the game.

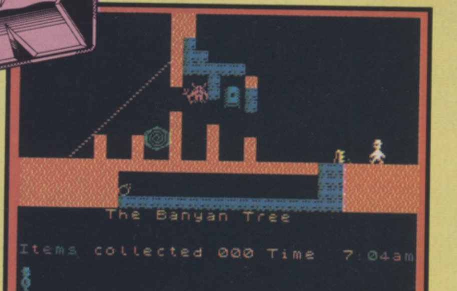
There is supposedly a threat of assassination if you mistreat your serfs but they never gave me much trouble, most games proceeding to a peaceful resolution with a points total dictating the winner.

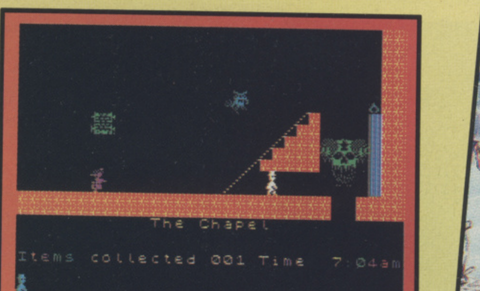
A few more hazards or a wittier range of consequences might have enlivened a game that reminds me of Lothlorien's old strategy games fo the ZX81. In this advanced age that won't do. — R.C.

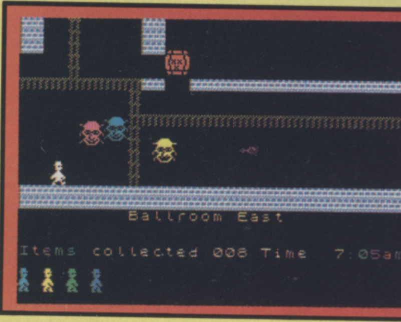


```
BARONY OF Martin

FOOD/MONEY      1685 DUBLOON/BUSH
LAND            80 ACRES
MERCENARIES     9
ARMED WITH      SPEARS
WORKERS         81

DO YOU WISH TO BUY OR SELL LAND
    B=BUY S=SELL N=NO
 EACH ACRE IS WORTH 12 DUBLOONS
```

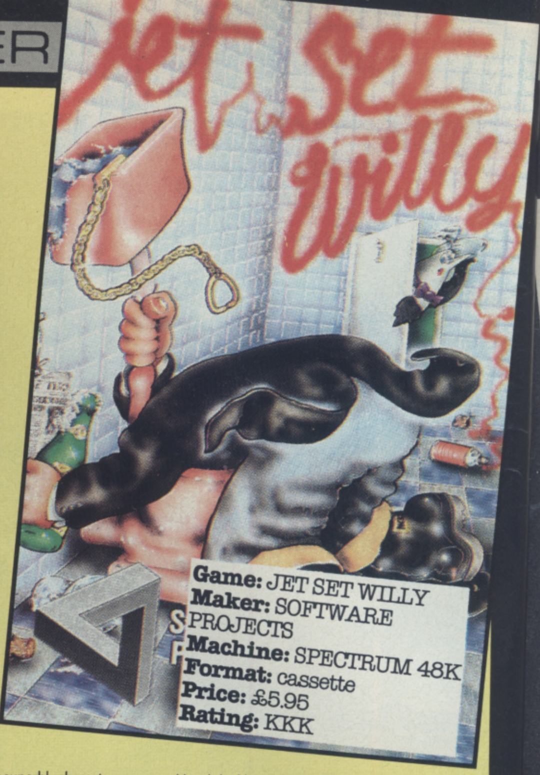
Game: BARON
Maker: TEMPTATION
Machine: SPECTRUM 48K
Format: cassette
Price: £6.99
Rating: K


The Banyan Tree
Items collected 000 Time 7:04am


The Chapel
Items collected 001 Time 7:04am


Ballroom East
Items collected 008 Time 7:05am

GREAT GAME, BUT...



Game: JET SET WILLY
Maker: SOFTWARE PROJECTS
Machine: SPECTRUM 48K
Format: cassette
Price: £5.95
Rating: KKK

Jet Set Willy arrived at the BIG K office late (thanks a bunch, SP), the prerogative you might say of the micro scene's cosmic megastar. However, this put me in the unenviable task of trying to review a game that, as I write, is already Number One (with a bullet) in most of the game charts. I guess that neatly disposes of the questions; will you like it and will it be a success!

So, for the few who've recently returned from swan-upping in darkest Belgium, here we have the second appearance of Miner Willy, fresh from his starring role in the Bug-Byte/Software Projects mega-hit *Manic Miner*.

Willy makes his elegant reappearance on the cover of *Jet Set Willy*, head down the lav in a graffiti-covered bathroom (tasteful, SP), his non-NCB approved wellies akimbo. The premise, it seems, is that Willy has become so stinking rich from the fortune he discovered in *Manic Miner* that he has bought himself a huge mansion and thrown the mother of all parties.

The party's over and Willy wants to crawl into bed (and die?) but his housekeeper insists he collects every glass and bottle left in the mansion before he can do so.

The stage is set for Willy to take off on another sojourn through the strange mind of Matthew Smith as each room he enters (and there are around 60) is some incredible carnival of moving things, hazards and rewards. In this respect it is identical to *Manic Miner*. All you have to do is keep Willy moving and try to jump over any traps or dangers. Use up all his lives and it's The Foot (unclad this time) for you, my lad.

The major disappointment for me was the lack of demo mode. SP claim *Jet Set Willy* is a "Total Graphics Adventure" (say what?) and are offering a Big Prize to the first person who cracks it. All well and good, but at least no-hopers like myself who can only manage about half a dozen screens had the chance of seeing the full range of Matthew Smith's lunacy on *MM*. Any kind soul out there want to tell me what I'm missing?

That said, *Jet Set Willy* is a worthy successor to *Manic Miner*. The graphics, amimation and sound are as good as, if not better than the original. Maria, the housekeeper, in particular, is superbly characterised. The way she taps her foot as Willy approaches his bed and then points an accusing finger towards the mess he has to clear up is brilliant.

Okay, compliments out of the way — let's talk about the security system on *Jet Set Willy*.

Software companies are of course going to fight the serious piracy problem in any way they can and I support them in the fight, but the hare-brained system in use on *JSW* isn't going to help anyone!

A small, inlay-sized card containing 180 different 4-colour combinations comes with each copy of *JSW*. Once loaded the program asks for the particular combination at column x, row y on the card. The user then has to search out that combination and key it in. You only get two attempts before the program wipes itself. There's no way you can erase a mistake.

The system fails on two levels. First, the card is too small and the print quality so bad that it is difficult to distinguish between a red and a magenta even if you have good eyesight. Secondly the system takes no account of people who are colour blind or who may be playing on black and white sets.

The system is a hindrance and I'm sure will discourage people playing *JSW* as often as they'd really like. A shame that a program of this quality and popularity should inhibit the majority of honest, fun-loving hackers on account of the actions of the minority of rip-off merchants.

Think again, SP.—**R.B.**

Pitching and Punching

The first two releases for the ColecoVision game system designed to make full use of the Super Action Controllers (see review next month) are EXCELLENT. Compared to the disastrous *Buck Rogers* game for the Adam, they are living proof that what Coleco do, they do darned well (and should perhaps have stuck to doing just that).

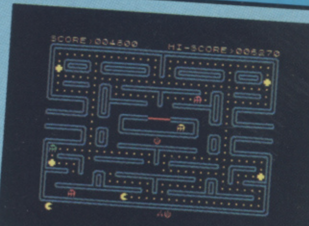
Rocky represents the fruits of a deal done between CBS and, one assumes, S. Stallone. Whale the tar out of your computer! The graphics are excellent — even filmically pictorial — and if they don't actually move that much, who cares? Using the various buttons, triggers and so on, on the futuristic Super Action gizmo, manoeuvre your pugilist (i.e. Rocky) across the ring and slug the stuffing out of your opponent, who can be the computer or a "pal". You can advance, retire, let fly with a straight right, low left, or duck, or guard your mug. The machine keeps time and every now and again you hit the canvas. Excellent piece of work.

Even better is CBS's *Baseball* for the same system. Again, using the many options available on the Controller, you control, not just a baseballer, but a whole team. Pitch! Hit! Run! Field! Buy popcorn! Well, actually, you can't do that but it feels as if you could. There's whistling from the crowd, "windows" to allow you to keep track of the field, and a choice of combinations for the pitcher to allow him to deliver a wide variety of balls. Graphics (as in *Rocky*) are excellent and pictorial — very American in style, very Coleco in execution.

All in all, these two games — used with the special Controller — represent the very pinnacle of the dedicated videogame art so far. Pricey but well worth it.—**T.T.**

Game: ROCKY and BASEBALL
Maker: CBS-COLECO
Machine: COLECOVISION
Format: ROM
Price: £29 or less (**Baseball** only available with Super Action Controllers)
Rating: KK

Too Late… Too Pricey!


SCORE:004600 HI-SCORE:006270

LIKE A GUEST late for his own party *Pac-Man* finally arrives on the Spectrum scene.

Yes, folks, the genuine, fully authorised, accept-no-fakes, original Ghost Gobbler is here. Purists who have been holding out against the hordes of Pac-Clones, this is it!

The best compliment that can be paid to Atarisoft's Spectrum edition of *Pac-Man* is that it is an extremely faithful reproduction of the original arcade barnstormer. All the ingredients that made the game a classic (ghosts, power pills, fruit, etc.) are rendered in easily recognisable graphics form.

In fact about the only thing that shows up the Spectrum's limitations is some rough animation. Sound, however, is very good and manages to retain the characteristic 'wacka wacka' sound of the game.

A high score table, attract mode, keyboard/joystick options and a cute 'interlude' after each two screens round off a generally high quality presentation — which is to be expected of an Atari product.

The big problem of course is that *Pac-Man* has already been done to death. Atari have attempted to close the proverbial stable door with the horse cold in its grave.

Even those who haven't already got some form of the ghost chomping game in their collections will be hard put to cough up nearly £15 for this cassette-based edition. Atari seem to be blind to the realities of the software market-place in this country. Someone had better perform some laser surgery on their corporate optic nerve before lack of foresight condemns this particular game to some dusty shelf in a Hall of Fame somewhere. — R.B.

Game: PAC-MAN
Maker: ATARISOFT
Machine: SPECTRUM
Format: cassette
Price: £14.99
Rating: KK

K = Could Be Better
KK = Could Be Worse
KKK = Unsurpassable

VLADS AND VLASSIES

"THERE are FATES WORSE than DEATH!!!" yells the cassette insert. "WARNING: We strongly recommend this game be played with the lights on," admonish the instructions sternly. This allegedly "Spine chilling Adventure game for the BBC micro," is in fact a bit of a mess. It starts off okay, with a "music while you wait" interrupt loader playing organ tunes as the bulk of the program loads, and even the odd bouncing skull; but once you hit the adventure the program's true nature is — gasp — at last revealed. The language parser is awful, accepting extremely limited two-word commands. Ygor also puts in an appearance (a "mythsstake"?) I couldn't find any graphics worth mentioning, although some sound effects were pretty neat, I should add.

Worst of all was the "smart" responses to unparsed or mis-spelt input. After the twentieth time, these become a little . . . how shall I put it . . . worn?

The program is very long, but I can't help feeling had it contained less rooms and more graphics/sound, it would have been tons better. Perhaps next time, Micrograf. — **A.G.**

Game: VAMPIRE CASTLE
Maker: MICROGRAF
Machine: BBC B
Format: cassette
Price: £7.95
Rating: K

KISS ME, HARDY

TRAFALGAR — a simulation of the great naval battle. Cannonballs smash into hulls and tear holes in sails. Magazines explode. (Others just lose circulation.) Ships sink. Flags are struck and prizes taken. Ah-ha.

Two opposing lines of ships face up to eachother. You select which ship to do battle from, and a "close up" is displayed, side on, of your and the enemy's ship. You then proceed to try and paste the other guy by firing cannonballs at him. Queensbury Rules apparently apply, however, as you have to take turns to zonk each other. "The other guy" can either be the computer or another human.

You give the elevation of the cannons, after taking the windage into account, and let fly. If you hit, pixels fry. This is fun for the first twenty shots, but then terminal monotony sets in. It's written in Basic, and I'm afraid I detected an unacceptable amount of windage coming from this program. —A.G.

Game: TRAFALGAR
Maker: SQUIRREL SOFTWARE
Machine: BBC B
Format: cassette
Price: £8.00
Rating: K

Woodman! Save that Tree!

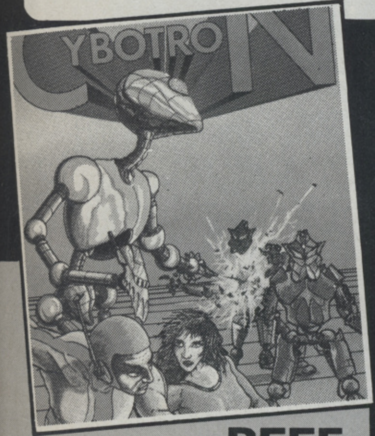
Woodland Terror is a text-only adventure for the Beeb. The action takes place in Mode 7, and heavy use is made of the teletext features: colour, flashing and double height text.

As it's written in machine code, the delay between commands and action isn't noticable. The lexical analyser (word processing routine) is an adequate verb-noun job, like GO WEST . . . GET BRICK, but nonetheless the texture descriptions give the game some charm and charisma.

The text is compressed, allowing a much larger and complex game than with usual methods (Acornsoft's adventure series, for example). The instructions are adequate, and my only real beef is that the scenario is a little — uh — traditional. Genie enslaves local inhabitants . . . hero called upon to release "the unhappy land" from tyranny!!!

However, it's a tight and neat adventure . . . well worth checking out. — **A.G.**

Game: WOODLAND TERROR
Maker: MP SOFTWARE
Machine: BBC B
Format: cassette
Price: £7.48
Rating: KK



BEEF

I have a beef with Cybotron. I may not always smite the sprites like a sprat out of Hell, but this time I'm putting the blame solidly on the game. Allow me to explain. The world has been taken over by robots who are intent on eliminating all mankind.

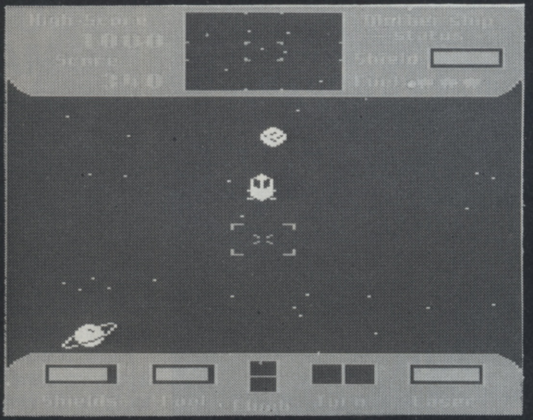
It is your task to kill the robots before they kill you. But here lies a problem, for as soon as you make your screen debut you are surrounded by robots. As you can only fire in the direction of travel, it is impossible to survive for very long.

The game took what seemed like an eternity to begin each time. Then to cap it all, I had to deal with "Fred Bloggs rules" written at the top of the starting screen every time.

I concede that the graphics were fairly handsome, but the soundage was as sweet as the sound of a rusty tin can being opened by human teeth. — **N.X.**

Game: CYBOTRON
Maker: ANIROG
Machine: COMMODORE 64
Format: cassette
Price: £7.95
Rating: K

Raiders of the Lost Cylon



A 3D space battle. A 'n F are pushing definitions a bit to call this game "3D", but they've got the space battle off to a T. Done in mode 5, the game's fairly colourful and very fast.

From a Star Trek- like main display that scrolls in two dimensions you've got to zonk the nasties by aligning them against stationary cross-hairs. This process is slightly confounded by the fact that the nasties are hurtling towards you! They appear to be suicidal (perhaps on account of so many lost relatives in Space Invaders) and unless you hit them first, they'll plough right into you. If you get too damaged, you can dock with your yellow mother-ship.

You've only limited shield energy and fuel, and the lasers have to have time to recuperate after every few shots. The animation is pretty good, except on the title sequence.

As you turn and accelerate, stars and other stellar debris (you know: an occasional Tardis, the odd binary star) fly past the main viewport, giving the game a good feel. Level one is manageable, but level two is impossible. — **A.G.**

Game: CYLON ATTACK
Maker: A&F
Machine: BBC B
Format: cassette
Price: £7.90
Rating: KK

HOMEWORK

"There was no escape." Yep. The thingies are back, not that they ever left for long. Another perspective '3D' game, and one of the faster ones. Sadly, to get the speed, the game lost out on features. On the faster levels, the slow response speed of the base you move at the bottom is a real drag.

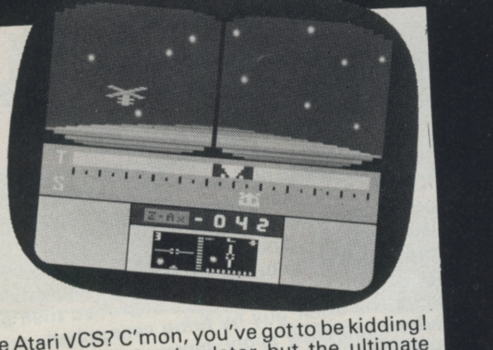
The animation becomes quite good on stage two, when asteroids hurtle from the screen towards you.

The nasties zap you with single lines, drawn with the VDU drivers all in one go, so you have no chance to avoid their fire. This is a random thing that the player can't really control.

So: graphically stunning and fast, but not enough work on the gameplan. — **A.G.**

Game: VORTEX
Maker: SOFTWARE INVASION
Machine: BBC B
Format: cassette
Price: £7.95
Rating: KK

The Orbiter Arbiter



A flight simulator on the Atari VCS? C'mon, you've got to be kidding! Nope, no joke this. Not only a flight simulator but the ultimate simulator — the Space Shuttle!

Incredibly Activision in general and Steve Kitchen in particular have managed to squeeze a full Space Shuttle mission into a video game system with less memory than your average brick. A magnificent effort that has worked.

You are in control of the 101st Shuttle mission (suitably far enough in the future to aid suspension of disbelief). Your brief is to blast off from Cape Canaveral, go into orbit and rendezvous with a satellite as many times as possible on the fuel you have, then go through re-entry and land your craft at Edwards Air Force Base in California. Simple, huh? Hah!

There's the small matter of digesting a superbly technical 32-page flight manual; familiarising yourself with about a dozen different on-screen displays and around 25 'Stat' message codes.

Then there are the controls. Every switch on the VCS console has a function (often two) from starting the countdown to opening and closing the cargo bay doors. An extremely useful overlay and 'crib sheet' is supplied which are tailored to fit the Atari console. Even the joystick has to cope with keeping the Shuttle on course in three axes as well as handling thrust and direction.

The screen displays a forward view through two of the Shuttle's windows. The limited graphics of the VCS are put to good use with convincing shots of space and the blue-green curvature of Earth rotating below. You really have to search for the satellite you are to rendezvous with but are rewarded with by a realistic rendering of it when eventually located.

Below the 'windows' are two horizontal thrust indicators and below those is the main display screen on which all flight conditions are monitored. The amount of information displayed in this small area is truly staggering and requires your full concentration.

So, once you have mastered all the above you can take on a mission or two. A safe return to base will earn you a ranking dependent on the number of dockings you've achieved and minimum fuel units used.

Now I'd be the first to admit that I've never actually flown in the Shuttle (I have this allergy to excessive vacuum and absolute zero) but I imagine that this f.sim comes pretty close to the real McCoy. As a computer f.sim *Space Shuttle* is excellent; as a VCS f.sim it is truly outstanding. I'm looking forward to discovering a lot more about it on future missions.—**R.B.**

Game: SPACE SHUTTLE
Maker: ACTIVISION
Machine: Atari 2600 VCS
Format: ROM
Price: £29.95
Rating: KKK

SENTENCED TO HARD LABOUR

Eureka! I know just what *The Sorcerer's Apprentice* felt like after all that wandage! He had a piteously sore wrist just like mine own after persevering through this merciless game. I carried on in a vain search for the clues needed to take on the adventure game that is a sibling cassette in this duo pack.

For those that knoweth not the olde tale, it goeth thusly: Whilst Merlin is out, his lazy apprentice uses magic to cheat on his cleaning chores. Merlin's spells go ape in the hands of the lad, and an uncontrollable army of living brooms drown Merlin's tasty gaff with dishwater.

Let me describe the "action". On yer left, brooms approach carrying pails of water towards screen right; a crudely-drawn vertical wall which is your dam. To win: protect your dam. The brooms will fill it with water and drown you, the brushes nick your bricks. To stop them, you simply stand in their way.

Nowhere near magical, alas — and outstanding only in that it's the nearest game-play gets to hard manual labour. The design is drab, the graphics are dull and indistinct, sound is partly naff — the same few notes from the film-music repeated ad wotsit. Its incentive rating is zilch.—**N.X.**

Game: THE SORCERER'S APPRENTICE
Maker: PHOENIX
Machine: COMMODORE 64
Format: cassette
Price: £6.99
Rating: none

SALTY SEADOG

Those despairing over the dearth of decent software for the unexpanded, underbrained VIC would do well to check out this salty seadog from Cap'n Micro. In it you must sail a beleaguered battleship through a positive storm of oceanic hostility. Shoals of missile-belching subs and low flying bombers do their best to scupper your tub and only some spirited manoeuvring will keep you afloat. It's no good relying on the ship's depth charges as you've only a score to drop.

Three speed levels add a bit of variety and the graphics are neat 'n' tidy. I quickly gravitated towards the fastest level — not, I hasten to add, because I was much cop, but because I found the wildly whizzing boat to be exceptionally comical. The thing would hurtle back and forth, totally out of control, spewing tiny black depth charges and promptly exploding at the first enemy salvo.

The scores were as low as my grin was toothy.—**S.K.**

Game: INVINCIBLE
Maker: MR MICRO
Machine: VIC 20
Format: cassette
Price: £6.90
Rating: KK

Spectrum
Joystick Compatible
DK'TRONICS
Compatible
Super Rapid Load
REALISTIC
SUPER
3D
ZIG ZAG
dk'tronics

YOU SAY TOMAYTO

I haven't seen a short young dude in weeks. But I keep right on looking. There's nothing else to do. Then suddenly I spot one! The little critter starts at the sound of my armoured Vecktrakker and legs it into the maze. I cram on the gas. The mug scuttles away — only to find itself cornered in a dead end. It's bulbous eyes spin like hubcaps and it rasps in defiance. With a grin I punch the Electron Interrogator . . .

Visually at least this SF maze chase is pretty impressive. Each maze, or sector, to use the vernacular, contains a family of Scarabags which, when confronted, are revealed to be nothing more than lolling, bug-eyed tomatoes. Your task is to fry these fruits and then move on to a new sector.

Unfortunately, despite the sharp visuals the gameplay is a trifle monotonous. Still, those fancying a short bout of tomato trashing will not be disappointed.—**S.K.**

Game: ZIGZAG
Maker: DK 'TRONICS
Machine: SPECTRUM 48K
Format: cassette
Price: £6.95
Rating: KK

BUCK ROGERS and the PLANET OF BLAH

The Official
BUCK ROGERS

Disappointing translation of an arca
goodie for the Colecovision Adam, wh
comes in the form of Coleco's high-sp
cassette. Basically, it's your actual *Tre*
all over again, along which Buck flies
well, he doesn't actually fly, more sor
staggers — while the usual crew of flick
monsters bop around in front of him. Cle
ing his way through this motley and de
edly unmenacing crew of interstellar pl
uglies, Buck then finds himself in spa
Now strange Saturn-like planets bob
weave and hurtle by in strings. Avoid
these with the usual numbskull piloting, B
moves into screen three, the surface
planet dotted with strange duplex tower

I mean, like, this is boring, you know?
it this way. For a debut game on an Enti
New System On Which Uncounted Ho
Rest etc., it's a turkey and then so
Although the actual Buckship mo
smoothly enough, the trench itself flick
by like one of those optical devices s
posed to make you travel-sick, while
objects, planets, towers and so on also
(there's the word!) through the grid a
written in BASIC. Put it another way: w
they slapped *Planet Of Zoom* together,
guy who wrote *Zaxxon* was out to lu
Literally.—**T.T.**

Game: BUCK ROGERS & THE PLANET OF ZOOM
Maker: CBS-COLECO
Machine: COLECO ADAM
Format: Coleco cassette
Price: £N/A (supplied with Adam computer)
Rating: none

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K = Could Be Better
KK = Could Be Worse
KKK = Unsurpassable

TAO GOES HIGH-TECH

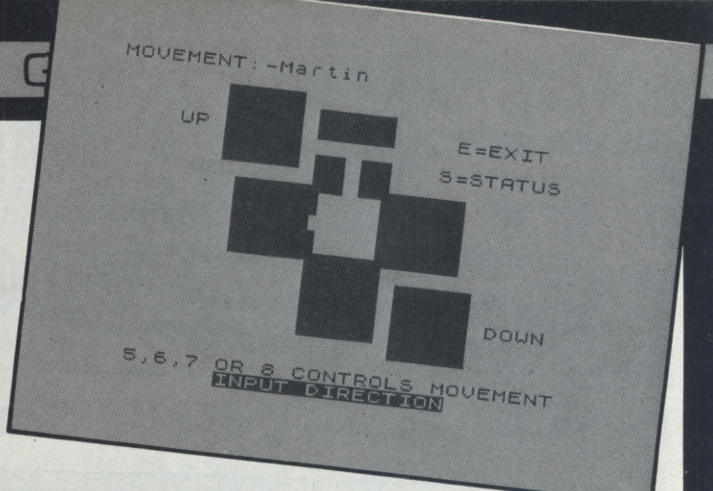
THE I-CHING is an ancient method of divination formulated by the wily Chinese more than four thousand years ago. Puzzled orientals would consult the oracle seeking guidance or re-assurance throughout their rice-encrusted lives. It was a source of great revelation. And now Tao has gone hi-tec with the release of this novel program from Virgin. You too will be able to delve into the mystical world of oriental philosophy!

The I Ching itself is composed of sixty-four individual hexagrams, each one accompanied by an appropriate text. Upon loading you'll be able to contruct this hexagram using the space bar. It's important that you bear in mind your question to the oracle as you do this, as an insincere poser will raise a scowl on the brow of the High Ching.

Once complete the hexagram is entered into the system and a message appears. Enlightenment is yours! Apparently based on the original works of one King Weng, the text is couched in a wonderful pseudo-mystical rhetoric that's guaranteed to raise a smile. "The superior man gives careful thought to criminal cases and hesitates before invoking the death penalty," it declares, before adding — rather ominously — "In the eighth month there will be evil!"

I find it hard to believe that anyone might take this at all seriously, but for unrelenting oddness it's hard to beat. To be loaded with tongue firmly in cheek, grasshopper! — **S.K.**

Game: I-CHING
Maker: VIRGIN GAMES
Machine: DRAGON 32
Format: cassette
Price: £6.95
Rating: KK



```
MOVEMENT:-Martin

UP
                         E=EXIT
                         S=STATUS

                              DOWN
5,6,7 OR 8 CONTROLS MOVEMENT
INPUT DIRECTION
```

DUNGEON EXPUNGIN'

Labyrinths full of beasts are all too familiar fare in adventure games, and Temptation's shot at this D&D development offers no fresh view on a rapidly tiring format.

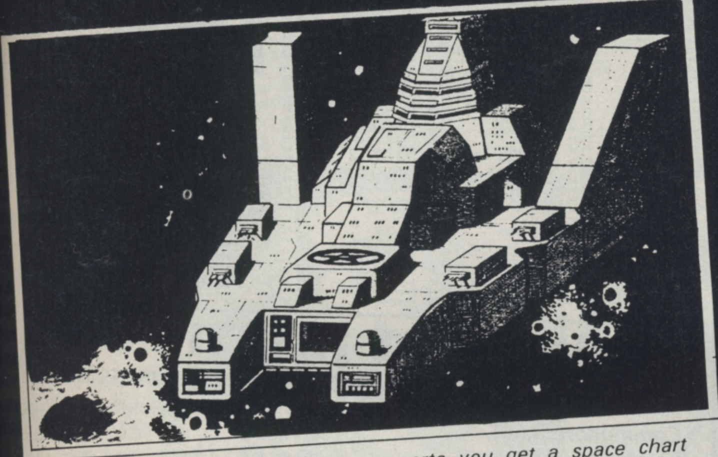
The most basic of graphics plot a colourless course through two choices of maze, both the the usual quota of basilisks, hobgoblins, etc. Nothing so exciting as seeing these creatures onscreen, of course — a presence in words only, with a choice of attacking (and you nearly always win) or retreating.

All you have to do is find a way out and collect treasure en route. Small sections of the floorpan are revealed to you as you go.

Not especially simple, I guess, but there's no thrill of escape, no tease in tracking out the solution. Sound is at a premium with the cursor keys offering a bare bleep for movement.

When there's a games like *Dragonslayer* or *Atic Atac* around, nobody's going to be much bothered with such a bloodless quest. — **R.C.**

Game: DUNGEONS OF DOOM
Maker: TEMPTATION
Machine: SPECTRUM 48K
Format: cassette
Price: £5.95
Rating: K



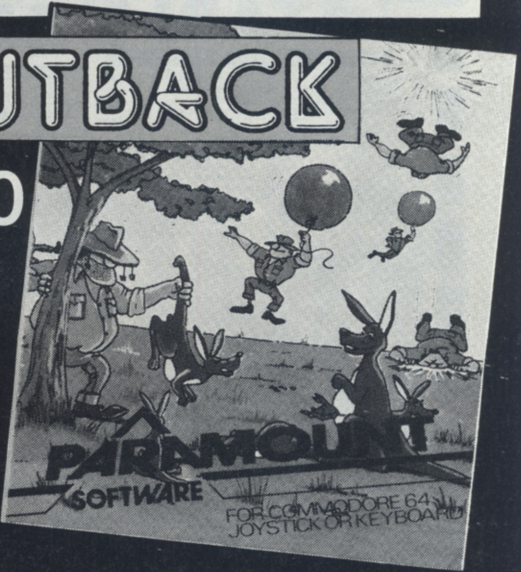
Adequate implementation of the standard ***Star Trek*** *game. As commander of the* ***USS Endeavor*** *it's your mission to go boldly where absolutely loads of people have gone before and eradicated the dreaded Krugon menace from the galaxy. Krugons are, of course, a filthy alien type not entirely dissimilar to Klingons. You begin each mission with a rather meagre complement of twenty photon torpedoes, limited phasars and a full tank of gas (gas?). These can all be replenished by docking with one of numerous Starbases throughout the game. All the complexities required of a* ***Star Trek*** *program have been included. There are energy levels to juggle with, shields to wield, warp speeds to watch and scanners to scan with. Thankfully the screen display is both clear and comprehensive. Along with all the various status reports you get a space chart which shows your position in regards to other quadrants and a local scanner which monitors the current areas of play. Animation on this is rather jerky and unimpressive.*

Needless to say there's a lot to consider and much patience is required. I just couldn't cope at all. Docking the damn thing was next to impossible. Inevitably I would guide the gleaming Starship thoughtfully into the side of an unsuspecting Starbase. It's a pity that I wasn't meant to be totalling them instead of Krugons. My ratings might have been more impressive. — **S.K.**

Game: SPACE FIGHTER
Maker: MICRODEAL
Machine: DRAGON 32
Format: cassette
Price: £8.00
Rating: KK

OUTBACK

HOW TO ROO THE DAY



In OUTBACK I was 'Big Roo', a mega kangaroo who had to protect a nest of bijou kangas from being bagged by swag-men. In the first stages of the game the swaggers drop from balloons. The next swarm are dropped from parachutes, and the final wave pop out of the hillside.

I valiantly defended my young 'uns, but found my movements infuriatingly limited. I was confined to bouncing up and down at one side of the screen, taking pot shots. Also there was a crucial spot just before the blaggers landed where my shots had no effect for no apparent reason.

The graphics were very cutesy, and the squeals uttered by the young kangaroos when bagged were almost heart-rending. However, this game did not turn my crank. It did not catch me in that fatal combination of challenge and frustration that prevents you from putting a game down. This kangaroo didn't tie me down, sport. — **N.X.**

Game: OUTBACK
Maker: PARAMOUNT SOFTWARE
Machine: COMMODORE 64
Format: cassette
Price: £7.50
Rating: K

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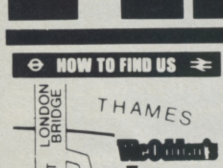

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A

TWILIGHT ZONE

FOR ANY SPECTRUM
Twilight Zone by Nick Outram
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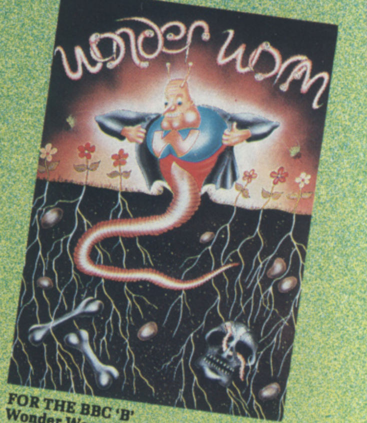
B



FOR THE BBC 'B'
Wonder Worm by Kevin Bramhill
Help Wally the worm turn into the mighty Wonder Worm by moving him around his garden eating the special pods as he goes. But beware not everything in Wally's Garden is friendly as you will soon find out.

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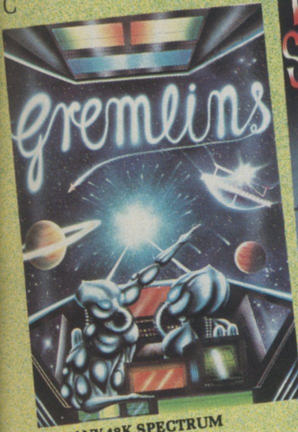


FOR ANY 48K SPECTRUM
Gremlins by Chris Kerry
Uranium has become the main fuel for Earth. Unfortunately Earth's supply of Uranium is dwindling fast. Jupiter has unlimited supplies of the precious metal, only one problem faces the Intergalactic miner robots from earth: GREMLINS.

D

Night Stalker

FOR ANY SPECTRUM
Night Stalker by Frankie Dunn
While working on a top secret experiment for the government, Professor Amron dropped some of his special formula onto the floor. Within minutes, the insects that were on the floor, became noticeably larger.
Your mission, to kill the insects before they can breed, but beware of the deadly Centipede.

E

JACK AND THE BEANSTALK

FOR ANY 48K SPECTRUM
Jack and the Beanstalk
by Chris Kerry
Will Jack get the riches from the Giant's castle without being stomped on. Will he climb the beanstalk without falling off; only you (and Jack) will know as you rush around looking frantically for the treasures you desire.

F

FOR THE 3K OR 8K EXPANDED VIC 20
Luv Bug by John Parker
Dudley is a bit of a Romeo, now try telling that to his girlfriend Bertha; she'll kill you. And that's what she intends to do to Dudley if she ever catches him. Linda is the new woman in Dudley's life and Dudley will need all your skill to help him avoid Bertha and still see Linda. Oh for the joys of Love!

G

BANG
BOOOM
BLOCKER

FOR THE BBC 'B'
Blocker by Martin Sykes
Poor Oswald is trapped inside a video game by the evil arch enemy the Bomber. His only chance of survival lies in your hands as you guide him around his ever decreasing grid.

H

ZAP
Spider's Web

FOR ANY SPECTRUM
Spider's Web by Peter Milne
Micky is a greedy little spider. He traps lots of Flies and Wasps on his web and then stores them to eat later but it's tough for Micky, as the Flies bite back.

I

FOR ANY SPECTRUM
Mega Fruit by Bob Hitching
This is the ultimate fruit machine, with all the features of the real Arcade machines, such as Nudge, Hold, Gamble etc.

J1 **VIC 20** J2 **CBM 64**

3D SILICON FISH

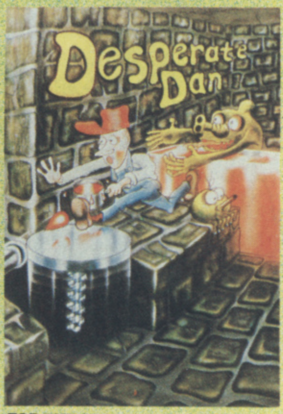
FOR THE UNEXPANDED VIC 20 and the CBM 64 (CBM with Adman Speech)
3D Silicon Fish by Chris Stamp
Sillo has to collect Silicon and return to Earth before the Krllyon destroys him. Will he make it and collect his reward? Only you can tell.

K

Pyramid Painter

FOR THE BBC 'B'
Pyramid Painter by Chas Smith
Can you help Bert the painter finish off the pyramids before the balls or Thin Man finish him?

L



FOR THE BBC 'B'
Desperate Dan by Reiner Bjerkeli
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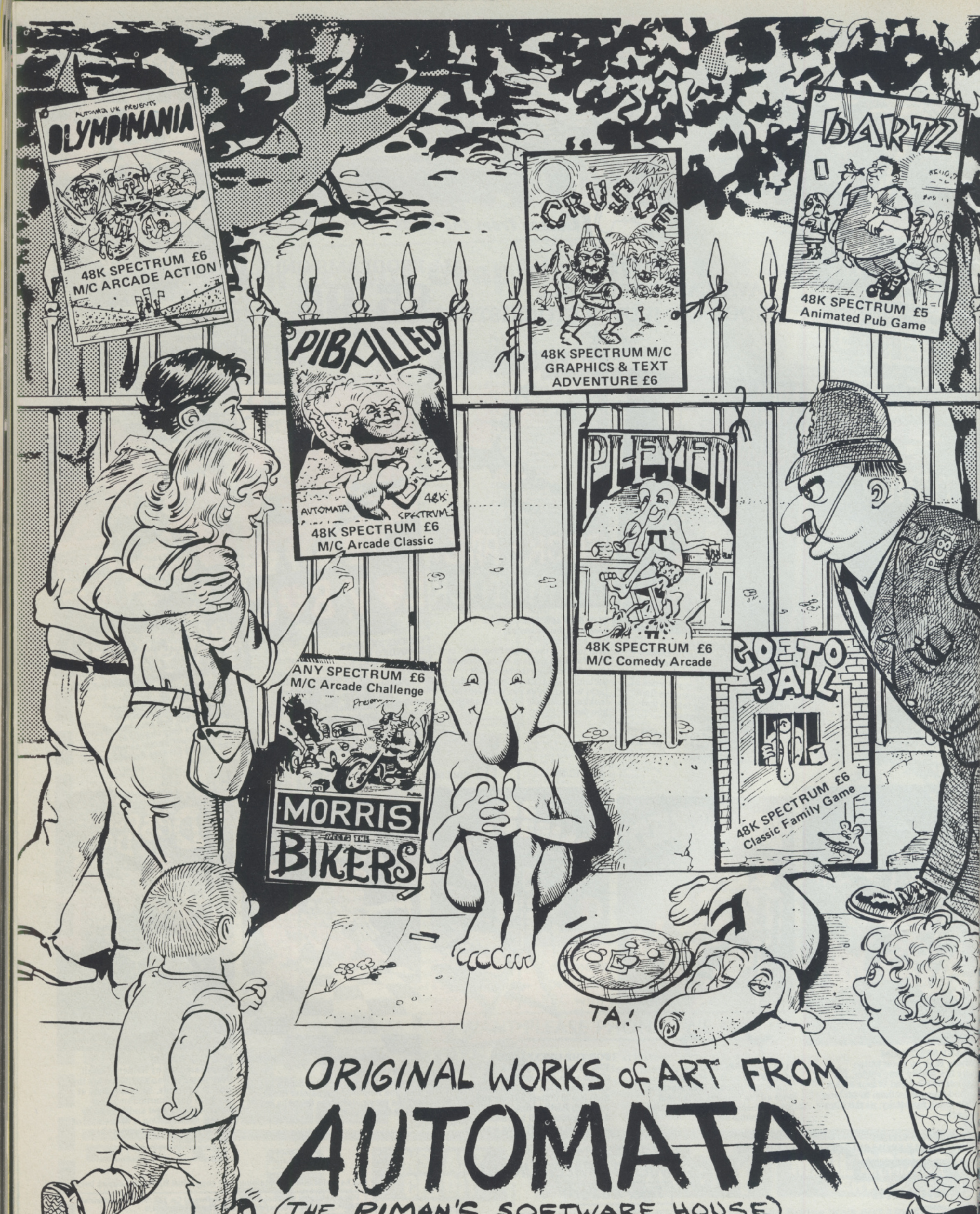
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Attacked by bats, nasties and everything that moves, intrepid explorer Hugo First fights his way through the spooky mansion collecting weapons, wakens Dracula and condemns him to a fiery hell. Great effects and sound, good machine-code graphics. 10 levels. 3 Lives. 7 screens.

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MEGAWARZ

Game: MEGAWARZ
Maker: PARAMOUNT SOFTWARE
Machine: COMMODORE 64
Format: cassette
Price: £7.50
Rating: KK

Mega Warz is a cracking game derived from Asteroids. To return to Earth you have to visit seven planets. Each has its own, increasingly determined nasty alien hordes to contend with. I *hate* to admit it, but I only got as far as Neptune. And it wasn't for lack of trying. It takes a lot of skill to manoever the sensitive spacecraft, without sending it flying into collision with a Baddie. That's my excuse and I'm sticking to it. Pure addiction — I loved it! — **N.X.**

Tri-Zapper

An attractive, smooth-running arcade three-parter that's simple enough to lure you inwards yet complex enough to give you a run for your money after a level or six (which frankly is all *I've* ever managed). You grapple first with what appear to be a mutant bunch of those tried and true *Invaders*, the spear-carriers of the video game and here, appropriately enough, dubbed "Walkons". This task is complicated by the gradual release of hazardous and disconcerting bouncing bombs. Proceed to the cunning bonus stage which entails some tricky manoeuvring of a "Henk Class Cruiser" before destroying some small and perfectly defenceless white dots. Finally you must pilot another ship through rows of enemy craft and past lethal comets in order to dispose of a hostile spy satellite.

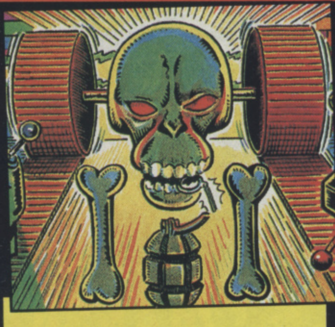
ultima ZONE
48K

Ultima Zone: A superb arcade triology in 100% Machine Code. Fight the Walkons, avoid the bouncing Brunes and battle your way though the deadly satellite zone. Requires 48K Oric

Thereafter it all repeats, but with more Walkons, bouncing bombs, enemy craft, comets, spy satellites and of course small, defenceless white dots.

Controls are pleasingly simple, graphics neat if a trifle flat and unimaginative. A game where calm and method count for more than flash and bravado which at first made me think its pleasures were subtle, but left me wondering whether they were merely shallow. — **P.R**

Game: ULTIMAZONE
Maker: TANSOFT
Machine: ORIC 48K
Format: cassette
Price: £8.50
Rating: KK



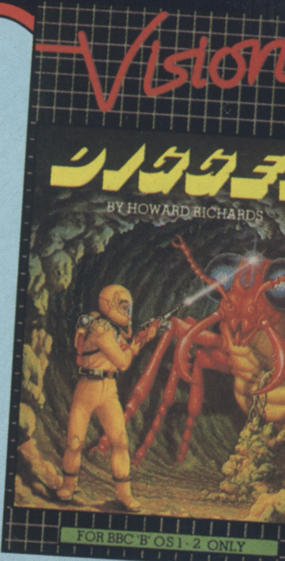
THOSE...

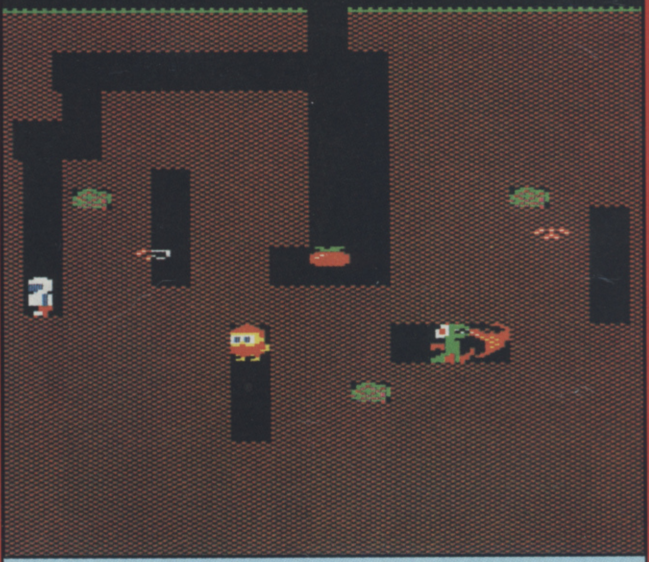
A witty and inventive "Paranoid Fantasy" — so sub-titled, it seems, because "THEY" are out to get you. Sure, that just gives it something in common with about 95% of all other arcade games, but in this one "THEY" are fiendish indeed: taunting demons, homing bombs and — worst of all — question marks that follow you around. Add to this some devilishly awkward controls — IJKM for up-down, left-right movement *and* firing direction plus further keys for shields and bullets — and it all adds up to the kind of game that can send you scuttling off to your first nervous breakdown. In short, it's horribly difficult.

Good job, then, that it's got a sense of humour. You, for example, are a dippy-looking smiley face. The question mark's a laugh too. So is the rather melodramatic fourth stage (actually, like the second, a bit of a doddle) in which you're trapped on a "Conveyorbelt To Doom", like a scene from an old Vincent Price movie, until you blast the "nightmares" in the time-honoured fashion. Even the fifth level, where you must match up pairs of funny bones with yet more smiley faces, looks like it might be a giggle but I've only got there a few times and am thus still thrust into a state of panic and confusion whenever I do. — **D.R.**

Game: THEM
Maker: VIRGIN
Machine: ORIC 48K
Format: cassette
Price: £5.95
Rating: KK

WHO DUG THIS UP?





What's this? *Digger?* Sounds like an Australian down a coal mine. Let's load it and see what happens (Loads program and reads title page). 'By the Keyboard Kid' says the screen. Yawn. The title page shows the controls so I know what to do. Up, down, left, right and pump. Pump? Nothing here about mending punctures (re-reads minimal instructions on package). Ah. It seems there's this garden plagued by things called Footas and Pubars which are highly averse to being pumped up with said pump. They have a tendency to explode. I'm sure I would too. Footars can breathe fire and gamma rays which is no good for the tomatoes so it's up to you to do something about it.

It only took a couple of goes to form an opinion about *Digger*. The sound was like the wind going out of a rubber duck. The graphics were slow and jerky with nasty glitches left on the screen when the beasts explode and the program crashed twice for no reason and had to be reloaded.

In a word forget it. I have. — **K.A.**

Game: DIGGER
Maker: VISION
Machine: BBC
Format: cassette
Price: £6.95
Rating: Zilch

Build up your character sets with this useful utility from N. DRUMMOND. Design your character on-screen in chunky or normal style. Fondle a font, create a capital or lay down a lower case.

BBC

CHARACTER DEFINER

```
  10PROCASSEMBLE:*FX4,1
  20ON ERROR GOTO 940
  30 :
  40REM" **************************
  50REM" **CHARACTER DEFINER**
  60REM" **  By N.Drummond   **
  70REM" **                  **
  80REM" **  V/1.0  (C)1982  **
  90REM" **************************
 100 :
 110DIMV%(8):N%=224
 120MODE7
 130FORI%=1TO2
 140PRINTTAB(0,I%);CHR$132CHR$157CHR$14
1CHR$135
 150PRINTTAB(11,I%);"CHARACTER DEFINER"
 160NEXT
 170PRINT':PRINTTAB(9)"MOVE"
 180PRINTTAB(9)"----"
 190PRINT"  I        UP"
 200PRINT" J/K   LEFT/RIGHT"
 210PRINT"  M       DOWN"
 220PRINT'"USE 'A' TO PLACE A DOT"
 230PRINT'"AND 'S' TO ERASE ONE"
 240PRINT'"WHEN A CHARACTER IS FINISHED
 THE '@'    SIGN GIVES THE VDU23 CODE."
 250PRINT'"DO YOU WISH CHUNKY(C) OR NOR
MAL(N) SIZE CHARACTERS?";:A$=GET$:IFA$="
C" MODE5:M%=1ELSEMODE4:M%=2
 260FORX=1TO8
 270FORY=1TO8
 280PRINTTAB(X,Y);"-"
 290NEXT,
 300PRINTTAB(12,0)"12345678":FORZ%=1TO8
:PRINTTAB(11,Z%);Z%:NEXT
 310PRINTTAB(1,1);
 320REPEAT
 330I$=INKEY$(0)
 340IFI$="A"ORI$="S"THENPROCNUM:PROCPRI
N
 350IFI$="I"ANDVPOS<>1THENVDU11
 360IFI$="J"ANDPOS<>1THENVDU8
 370IFI$="K"ANDPOS<>8THENVDU9
 380IFI$="M"ANDVPOS<>8THENVDU10
 390UNTILI$="@"
 400INPUT TAB(0,20)"FINISHED",Q$:IF Q$=
"Y" THEN MODE7:VDU14:PROCDFLIST:END
 410PRINTTAB(0,21);"VDU23,";N%:FORI=1TO
4:PRINT ",";V%(I);:NEXT:VDU10,13:FORI=5T
O8:PRINT",";V%(I);:NEXT
 420PRINT:PROCCHANGE
 430GOTO260
 440DEFPROCNUM
 450P=8-POS:VP=VPOS
 460IFP=0THENNUM=1ELSENUM=2^P
 470A%=135
 480C=(USR(&FFF4)AND &FF00)/&100
 490IFI$="A"AND C=45 V%(VP)=(V%(VP)+NUM
)
 500IFI$="S"AND C<>45 V%(VP)=(V%(VP)-NU
M)
 510ENDPROC
 520DEFPROCPRIN
 530P=POS:V=VPOS
 540IFI$="A"PRINTTAB(POS,VPOS);"*"ELSEP
RINTTAB(POS,VPOS);"-"
 550VDU23,N%:FORI%=1 TO8:VDU V%(I%):NEX
T
 560PRINTTAB(4,11);CHR$(N%)
 570PRINTTAB(P,V);
 580ENDPROC
 590DEFPROCCHANGE
 600PRINTTAB(0,29):FORH%=224 TO255:PRIN
TCHR$H%;:NEXT
 610INPUT TAB(0,24)"POSITION:",Y$:IF Y$
="N" GOTO640
 620INPUT"X,Y ON GRID",X1%,Y1%:IFX1%<1O
RX1%>8 ORY1%<1ORY1%>8 THEN640
 630PRINTTAB(11+X1%,0+Y1%);CHR$(N%)
 640PROCCL
 650PRINTTAB(0,20)"WHICH CHARACTER DO"
 660PRINT"YOU WISH TO RE-"
 670INPUT"DEFINE NEXT(224-255)",N%:IF N
%<224 OR N%>255 GOTO 650
 680VDU23,N%:FORI%=1 TO8:VDU0:V%(I%)=0:
NEXT
 690PRINTTAB(4,11),CHR$(N%)
 700PROCCL
 710ENDPROC
 720DEF PROCDFLIST
 730FORI%=224 TO 255
 740?&D00=I%
 750CALL CODE
 760PRINTTAB(0)"CHR ";?&D00;" ";
 770FORJ%=1 TO8
 780PRINT TAB(J%*3);~?(&D00+J%);
 790NEXT,:VDU10,&D
 800ENDPROC
 810DEFPROCASSEMBLE
 820DIM CODE 10
 830FORPASS=0 TO2
 840P%=CODE
 850[OPT PASS
 860LDA£&A:LDX£0:LDY£&D
 870JSR &FFF1
 880RTS
 890]NEXT
 900ENDPROC
 910DEFPROCCL
 920FORI%=20 TO 28:PRINTTAB(0,I%);SPC(M
%*20):NEXT
 930ENDPROC
 940IF ERR<>17 THEN REPORT:PRINT"@ Line
 ";ERL:END
 950*FX4,0
 960MODE7
>
```

PADLOCK

Keep unauthorised fingers off your BBC micro with this useful utility. KIM ALDIS opens the door to secure progs . . .

HAVE YOU EVER come home after a hard day's graft and a less than invigorating bus journey and found everyone bar the cat crammed around your BBC, oblivious of everything except the annihilation of any alien daft enough to stick his head round the screen? If you had the foresight to build the BIG K EPROM Programmer then this could all change because now you can hardware lock your computer with *Padlock*.

Padlock is a short machine code routine which you can blow into an EPROM and place in one of the sideways ROM sockets of your computer. When inserted it stops anyone using the computer without a password.

The accompanying listing contains the *Padlock* routine along with a BASIC utility so that you can easily set up the sort of display you want and your own personal entry code.

First of all type in the listing. Before you do anything else save it to tape. If you don't and you've made a mistake you may find the system will crash and you'll have to start all over again. It wouldn't hurt to have a friend to check through it with you as well. Remember that the only real test for bugs in the assembler section is when the code is blown into the EPROM.

When run the program will present a prompt asking you to input the display message which will confront you when you switch on (you might wish to display your name and address in case the machine is stolen). The program allows you to include carriage returns so you can format the display in any way you wish but you can only have 250 characters. There is a small display in the top right corner indicating how many characters you have left. It's useful to remember that the SHIFT function keys will insert control characters so that you can have colours in the display.

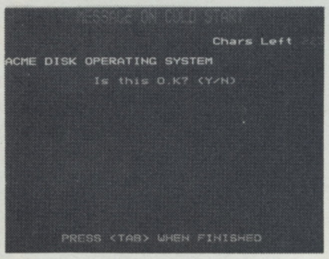
When satisfied press the <TAB> key and you will be asked to input the entry code. The same rules apply as before but don't make the code too complicated. If you forget it you won't be able to use your own machine! Remember that *Padlock* will also expect any spaces or control characters that you enter here.

You will now be asked whether you want the routine assembled with the test addresses or EPROM addresses. You would be well advised to test the routine first so press T. The program will call *Padlock* three times. Firstly as though it were a cold start and finally as from BASIC, you will have to type 'OLD' to get your program back (this routine is not really to test your display but more as a means of checking for bugs in the machine code).

Now you know that the program works you can run it again and assemble it with the EPROM addresses. The program will now save the buffer for you ready to load into the buffer area of the EPROM programmer.

After the EPROM is blown it can be placed in any of the sideways ROM sockets but it must have a lower priority than BASIC (i.e. in any socket left of BASIC). A word of warning about this one. If you don't feel confident about playing around inside the computer then get someone who knows to do it for you. Cracked boards and bent pins on chips can be expensive!

You can also call *Padlock* with *LOCK at any point in a BASIC program, useful if you want to keep that blockbusting game you've been working on away from pirates!



```
MESSAGE ON COLD START
                          Chars Left
ACME DISK OPERATING SYSTEM
            Is this O.K? (Y/N)

        PRESS <TAB> WHEN FINISHED
```

There are several ways of entering paged ROMs on the BBC Micro, but the method we are interested in is known as 'Service Call Entry'. Under certain conditions the ROMs are scanned with a number in the accumulator according to the type of service requested. The ROM can inspect this number and decide whether to take action or not.

When paged ROMs are entered an information block is expected by the operating system. This is set up by PROCheader and contains information like jump instructions for the service and language entry points and the title and copyright strings of the EPROM.

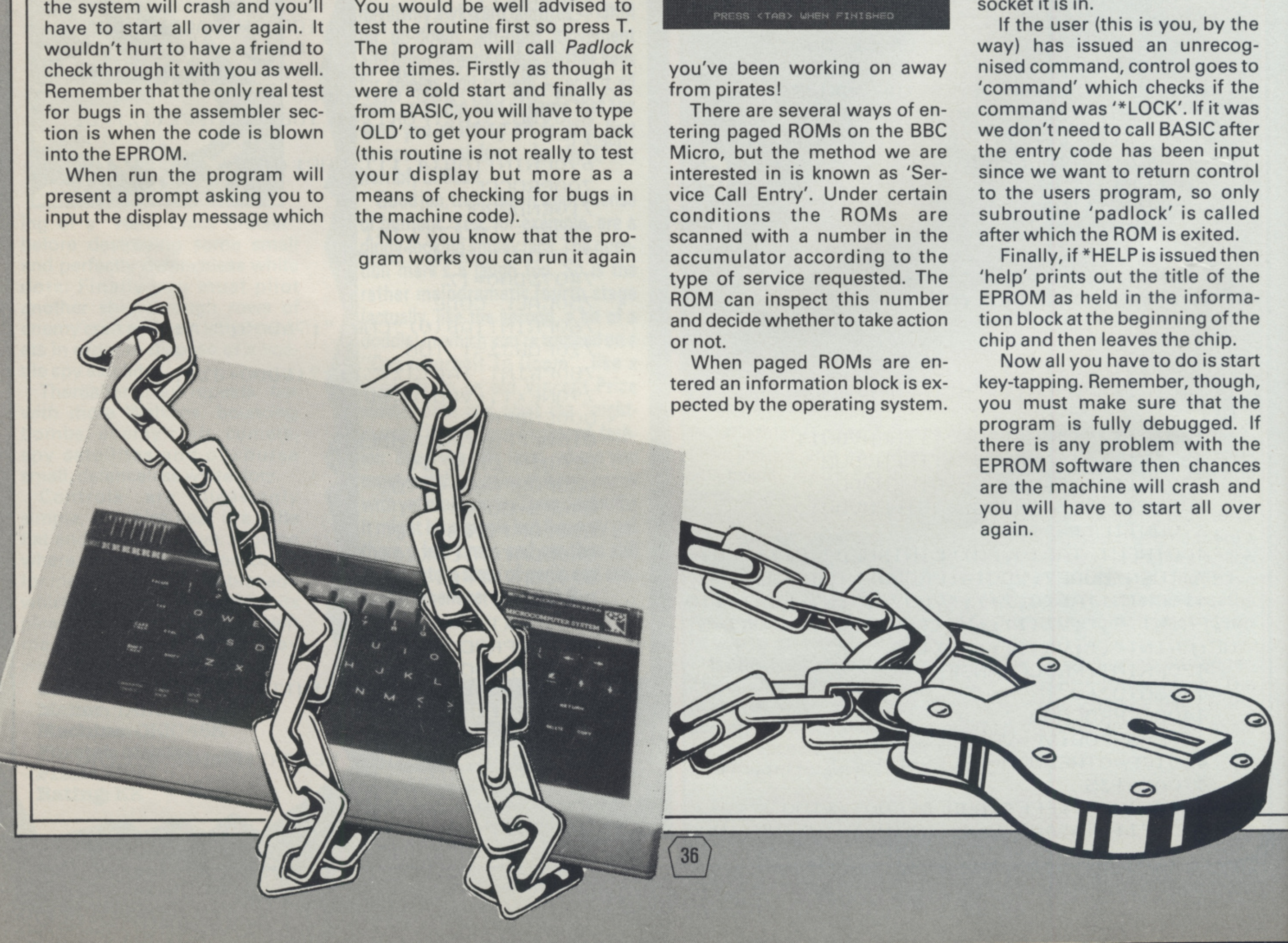
The three service calls that we need to intercept are Break, *HELP and unrecognised operating system command (a '*' command). These will enter into the ROMs at the service entry point ('service') with the numbers 3, 9 and 4 respectively in the accumulator and if you look at lines 210 to 280 you can see that the first thing we do is to check for these numbers and branch to the appropriate subroutines if they are detected. If not the ROM is excited.

If a Break is detected control is passed to the subroutine 'break'. This saves the registers and then calls two further subroutines, 'padlock' and 'basic'. The 'padlock' routine prints the display message to the screen and waits for the correct entry code after which 'basic' enters BASIC after finding out which socket it is in.

If the user (this is you, by the way) has issued an unrecognised command, control goes to 'command' which checks if the command was '*LOCK'. If it was we don't need to call BASIC after the entry code has been input since we want to return control to the users program, so only subroutine 'padlock' is called after which the ROM is exited.

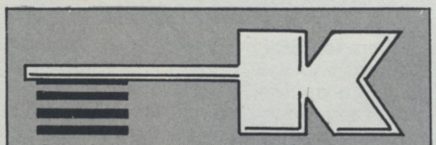
Finally, if *HELP is issued then 'help' prints out the title of the EPROM as held in the information block at the beginning of the chip and then leaves the chip.

Now all you have to do is start key-tapping. Remember, though, you must make sure that the program is fully debugged. If there is any problem with the EPROM software then chances are the machine will crash and you will have to start all over again.



```
  10REM"***************
  20REM"*** PADLOCK ***
  30REM"** KIM ALDIS **
  40REM"***** (C) *****
  50REM"**** 1983 *****
  60REM"***************
  70*KEY10OLD M
  80MODE7
  90buffer%=&3000:ret$=CHR$&0D+CHR$&0A

100OSASCI=&FFE3:OSWRCH=&FFEE:OSBYTE=&FFF
4:OSRDCH=&FFE0:OSNEWL=&FFE7
 110PROCheader_code
 120PROCmessage
 130PROCkey
 140PROCtest_or_eprom
 150
 160REM"_____________________________
 170
 180FOR T%=opt1% TO opt2% STEP 2
 190P%=p%:O%=o%
 200[OPT T%
 210.service
 220            PHP
 230            CMP #9
 240            BEQ help
 250            CMP #4
 260            BEQ command
 270            CMP #3
 280            BEQ break
 290            PLP
 300            RTS
 310.break
 320            PHA
 330            TYA
 340            PHA
 350            TXA
 360            PHA
 370            JSR padlock
 380            JSR basic
 390            PLA
 400            TAX
 410            PLA
 420            TAY
 430            PHA
 440            PLP
 450            RTS
 460.command
 470            PHA
 480            TYA
 490            PHA
 500            TXA
 510            PHA
 520            LDX #0
 530.loop1
 540            LDA (&F2),Y
 550            AND #&DF
 560            CMP command_code,X
 570            BNE not_ours
 580            INY
 590            INX
 600            CMP #&0D
 610            BNE loop1
 620.ours
 630            LDA #&C
 640            JSR OSWRCH
 650            JSR padlock
 660            PLA
 670            TAX
 680            PLA
 690            TAY
 700            PLA
 710            PLP
 720            LDA #0
 730            RTS
 740.command_code
 750          EQUS"LOCK"+CHR$&0D
 760.not_ours
 770            PLA
 780            TAX
 790            PLA
 800            TAY
 810            PLA
 820            PLP
 830            RTS
 840.help
 850            PHA
 860            TYA
 870            PHA
 880            TXA
 890            PHA
 900            JSR OSNEWL
 910            LDX #0
 920.loop2
 930            LDA buffer%+9,X
 940            JSR OSASCI
 950            INX
 960            CMP #0
 970            BNE loop2
 980            JSR OSNEWL
 990            CLC
1000            BCC not_ours
1010.padlock
1020            CLI
1030            LDY #0
1040.display
1050            LDA messagecode,Y
1060            JSR OSWRCH
1070            INY
1080            CMP #0
1090            BNE display
1100            LDY #0
1110.prompt
1120            LDA promptcode,Y
1130            JSR OSASCI
1140            CMP #0
1150            BEQ lock
1160            INY
1170            BNE prompt
1180.lock
1190            LDY #0
1200.unlock
1210            LDX keycode,Y
1220            CPX #0
1230            BEQ unlocked
1240            CPX #10
1250            BEQ inc
1260            JSR OSRDCH
1270            JSR OSASCI
1280            CMP keycode,Y
1290            BNE lock
1300.inc
1310            INY
1320            JMP unlock
1330.unlocked
```



Careful typing — the BIG K key to success with listings

```
1340            RTS
1350.basic
1360            LDX #0
1370            LDY#&FF
1380            LDA #&BB
1390            JSR OSBYTE
1400            LDA #&8E
1410            JSR OSBYTE
1420            RTS
1430\"_______________________________
1440.messagecode
1450EQUS
ret$+CHR$129+CHR$136+CHR$141+STRING$(8,"
")+"HARDWARE
LOCKED"+ret$+CHR$130+CHR$136+CHR$141+STR
ING$(8," ")+"HARDWARE LOCKED"+ret$+ret$
1460EQUS message$
1470EQUB 0
1480\"_______________________________
1490.keycode
1500EQUS key$
1510\"_______________________________
1520.promptcode
1530EQUS
CHR$&0D+CHR$&0D+CHR$130+STRING$(7,"
")+"Enter Security Code
:-"+CHR$&0D+CHR$&0D+CHR$&0D+CHR$&0D+STRI
NG$(5," ")+CHR$&3F
1540EQUB 0
1550]NEXT
1560REM"_____________________________
1570?(buffer%+1)=padlock MOD 256
1580?(buffer%+2)=padlock DIV 256
1590?(buffer%+4)=service MOD 256
1600?(buffer%+5)=service DIV 256
1610IF testadd% THEN IF
FNoption(CHR$130+"Test Run ","Y","N")
PROCtestrun
1620IF epromadd% THEN IF
FNoption(CHR$130+"Save Assembled Code To
Tape ","Y","N") THEN *SAVE"Padlock" 3000
3400
1630END
1640REM"_____________________________
1650DEFPROCheader_code
1660!buffer%=&4C00004C
1670!(buffer%+4)=&14C20000
1680!(buffer%+8)=&44415001
1690!(buffer%+12)=&4B434F4C
1700!(buffer%+16)=&302E3100
1710!(buffer%+20)=&29432800
1720!(buffer%+24)=&204D494B
1730!(buffer%+28)=&49444C41
1740!(buffer%+32)=&39312053
1750!(buffer%+40)=&3438
1760ENDPROC
1770REM"_____________________________
1780DEFPROCmessage
1790*FX219,0
1800CLS:PROCdouble(CHR$129+"MESSAGE ON
COLD START ",0)
1810PROCcentre(CHR$133+"PRESS <TAB>
WHEN FINISHED ",23)
1820PRINTTAB(26,3);"Chars
Left";CHR$129;"250"
1830PRINTTAB(0,5);
1840letter%=0:message$=""
1850REPEAT
1860A$=GET$
1870IF ASC(A$)=13 A$=A$+CHR$10
1880IF ASC(A$)=127 AND
ASC(RIGHT$(message$,1))=10 THEN
message$=LEFT$(message$,length%-2)
1890IF ASC(A$)=127 AND
ASC(RIGHT$(message$,1))<>10  THEN
message$=LEFT$(message$,length%-1)
1900IF ASC(A$)<>127
message$=message$+A$
1910length%=LEN(message$)
1920IF length%=230
PRINTTAB(20,3);CHR$136:VDU 7
1930PRINTTAB(37,3);250-length%;" "
1940PRINTTAB(0,5);message$;
1950PRINT" ";CHR$127;
1960UNTIL A$=CHR$(0) OR length%>=250
1970IF NOT FNoption("Is this
O.K?","Y","N") OR (LEN(message$)>250)
THEN 1800
1980ENDPROC
1990REM"_____________________________
2000DEFPROCkey
2010CLS:PROCdouble(CHR$129+"ENTRY CODE
",0)
2020PROCcentre(CHR$133+"PRESS <TAB>
WHEN FINISHED ",23)
2030PRINTTAB(26,3);"Chars
Left";CHR$129;"250"
2040PRINTTAB(0,5);
2050letter%=0:key$=""
2060REPEAT
2070A$=GET$
2080IF ASC(A$)=13 A$=A$+CHR$10
2090IF ASC(A$)=127 AND
ASC(RIGHT$(key$,1))=10 THEN
key$=LEFT$(key$,length%-2)
2100IF ASC(A$)=127 AND
ASC(RIGHT$(key$,1))<>10 THEN
key$=LEFT$(key$,length%-1)
2110IF ASC(A$)<>127 key$=key$+A$
2120length%=LEN(key$)
2130IF length%=230
PRINTTAB(20,3);CHR$136:VDU7
2140PRINTTAB(37,3);250-length%;" "
2150PRINTTAB(0,5);key$;
2160PRINT" ";CHR$127;
2170UNTIL A$=CHR$(0) OR length%=250
2180IF NOT FNoption("Is this O.K.
","Y","N") OR LEN(key$)>250 THEN 2010
2190CLS
2200ENDPROC
2210REM"_____________________________
2220DEFPROCtest_or_eprom
2230testadd%=FALSE:epromadd%=FALSE
2240PRINT'''
2250IF FNoption("TEST OR EPROM
ADDRESSES","T","E")p%=buffer%+&28:o%=0:o
pt1%=0:opt2%=2:testadd%=TRUE ELSE
p%=&8028:o%=buffer%+&28:opt1%=4:opt2%=6:
epromadd%=TRUE
2260PRINT''
2270ENDPROC
2280REM"_____________________________
2290DEFFNoption(A$,B$,C$)
2300PROCcentre(CHR$130+A$+"
("+B$+"/"+C$+") ",VPOS+2)
2310REPEAT
2320opt%=GET
2330IF opt%>96 opt%=opt%-32
2340opt$=CHR$(opt%)
2350UNTIL opt$=B$ OR opt$=C$
2360IF opt$=B$ =TRUE
2370=FALSE
2380REM"_____________________________
2390DEFPROCdouble(A$,y%)
2400x%=(38-LEN(A$))/2
2410PRINTTAB(x%,y%)CHR$141;A$
2420PRINTTAB(x%,y%+1)CHR$141;A$
2430ENDPROC
2440REM"_____________________________
2450DEFPROCcentre(A$,y%)
2460x%=(40-LEN(A$))/2
2470PRINTTAB(x%,y%);A$
2480ENDPROC
2490REM"_____________________________
2500DEFPROCtestrun
2510CLS
2520A%=9:CALL service
2530A=INKEY(200)
2540
?&F3=&60:?&F2=0:$&6000="LOCK":A%=4:Y%=0:
CALLservice
2550A%=3:CALL service
2560ENDPROC
```

68000 ASSEMBLER

Part 2 of BERNARD TURNER'S examination of this year's 'wonderchip'

THIS IS the second in a series of articles on the Motorola 68000 Microprocessor Unit, a silicon chip that has gained star status by virtue of being selected (in its 8-bit guise) by Sir Clive's Merry Men to grace the Sinclair QL.

It should not be overlooked that this very useful chip has been around for quite some time and is now appearing in computers such as Apple's Lisa, MacIntosh and Fortune 16/32.

The 68000 has evolved from the Motorola stable from the 6800 through the 6809, finally to its present day implementation which has 10 times the relative processing performance of its original ancestor.

HIGH-LEVEL

As in life, there are pros and cons of doing anything in a particular manner. In the case of 68000 language processing one might argue that high-level languages would be naturally faster than its 8-bit cousins, by way of benefitting from the chip's high-level language support philosophy. You could also put forward the view that, generally, high level languages are more productive from a time-taking point of view. Again I would agree with you — but point out that an assembly language program would be faster and more efficient during processing. I would also point out that if you write untidily and without thought for structure in a high-level language then it, too, can be difficult to debug. One place a high-level language can score is in its portability, should it in theory run on another machine using the same high-level language — but we all know what happens in practice! This is where assembly language very often fails. Due to its nature, it is often dependant on the hardware for which it has been written. Often it is necessary to have a thorough understanding of the hardware to make the best use of the machine; this may entail obtaining, reading and using knowledge from chip manufacturers' Data Sheets (information on a particular chip and its functions). Hopefully you can see from this that the language you choose to use is a matter of 'horses for courses'. I wouldn't (couldn't!) program a real time interactive arcade style game in R.P.G. II, but I would use it to program a report on insurance premiums with sub-totals. But then, I'm naturally boring.

If you have programmed in a high-level language (presumably BASIC) you may not have known what is actually happening. Generally in interpreted BASIC, you have typed in a program and given the computer the command 'RUN', oblivious of the fact that simply to print the letter 'a' the processor has had to read what keys you have pressed, convert them to ASCII, store them in memory, validate your command, then decide where on the screen to print — and, if applicable, what bytes make up the image of an 'a' character when printed — finally returning to a routine that waits for your next key press.

The above may sound like a lot of work — and it is. But that is only an overview of what machine code does. Take the part above about 'validate your command'. What this entails is analysing your instruction, determining what is required to be done and doing routines at the 'machine level' to achieve that. By 'machine level' I mean the point where the software has finally, really, reached the hardware.

READ AND WRITE

BASIC and other languages reside in memory (generally RAM so that they can be changed as required). When you run a program you do not think too much about where it is placed (location) in memory; similarly you never think twice where, and in what form, variables are located. When programming in assembly language that now becomes *your* decision. To help you manufacturers usually provide a 'memory map' of the machine. This normally gives you information such as at what address the screen starts and what address it ends at. ('Address', by the way, is only another word for 'location'). Other useful addresses generally given are operating system areas used, ROM locations, and, if the company is feeling benevolent, starting points (entry points) to useful machine code routines such as reading the keyboard and writing to the screen. A part of the machine you cannot usually access from a high-level language is the microprocessor itself. It is not part of the memory (see Fig 1) and thus you cannot read from it or write to it (from a high-level language) it normally contains its own memory called registers which can be manipulated by machine code instructions (generated by using an assembler).

REGISTERED BITS

The 68000 contains two main types of registers — Data Registers and Address Registers. There are at any one time 8 of each available. They have names rather boringly called D0 to D7 for the Data Registers and — surprise, surprise — A0 to A7 for the Address Registers. They are all 32 bits wide (i.e. can hold a four byte value). There are three more registers in the 68000 and they are called the Program Counter, the Stack Pointer and the Status Register. The Program Counter and the Stack Pointer are both 32 bits wide whereas the Status Register is only 16 bits. The Program Counter holds the address of the next instruction to be processed from memory. The Status Register serves as an indicator to what has occurred in the machine. The Stack Pointer is used to contain the next free address in memory to the 'stack'. The stack can be likened to a very temporary note pad where information can be placed and retrieved. The Stack is not a Register itself and is not contained in the MPU but is assigned (allotted) an area of memory in which it can expand and contract. (Much more about the stack later).

Finally there is a register that is sometimes available and sometimes not. We have already mentioned it under stack pointer AND A7! The truth of the matter is that A7 and the Stack Pointer Register are the one and same thing. But just to complicate everything it has an auto-ego! There are in fact two Stack Pointers of which one only is accessible at a time. These two A7's both have names:- the 'User Stack Pointer' and 'The Supervisor Stack Pointer'. What determines which one is accessed is the state of a bit in the Status Register. A bit, as you know, can be either set to a logical '1' or a '0', it cannot be both, therefore it is either one Register (e.g. User Stack Pointer) or the other (in this example the Supervisor Stack Pointer). (See Fig 2).

What has just been discussed is often termed 'the internal architecture' of a chip (it in fact encompasses the instructions as well). The *external* architecture is the memory and support chips and how these are arranged. In the 68000 MPU series the program counter and addressing of memory must occur on an even boundary (see Fig 3), if it doesn't then an exception occurs (a condition that the processor must attend to as quickly as possible).

The Motorola 68000 Microprocessor Unit (MPU) is the basis of a series of chips based on the same architecture. Its design philosophy is based on providing a simple, yet powerful, compact, yet useful instruction set and facilities both in hardware and software to enable it to be productive. In the next instalment we'll make a start on some machine code.

Figure 1

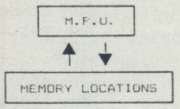


Figure 2

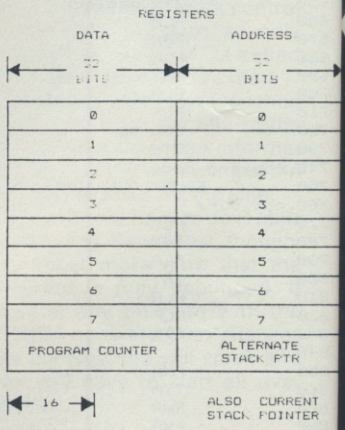
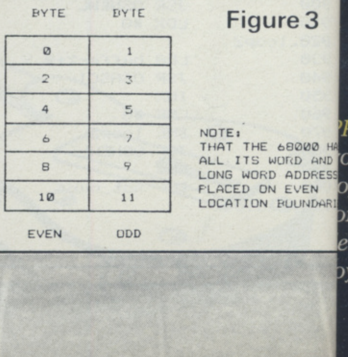


Figure 3



NOTE:
THAT THE 68000 HA
ALL ITS WORD AND
LONG WORD ADDRESS
PLACED ON EVEN
LOCATION BOUNDARI

A
CO
PROGRAM
ou writte
oftware! S
or assessm
etails of o
oyalty sch

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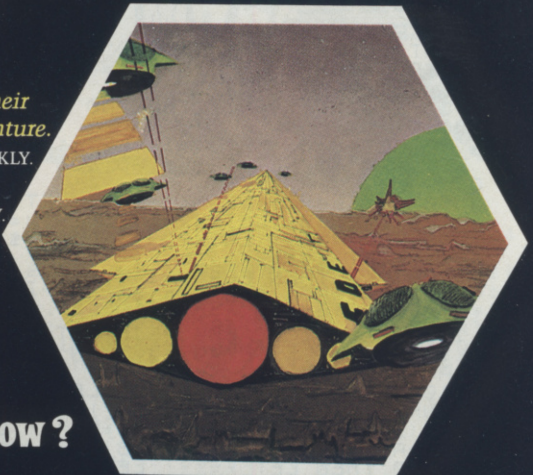
The corrupt Emperor must be eliminated and you have been chosen!
By Tyrone Howe



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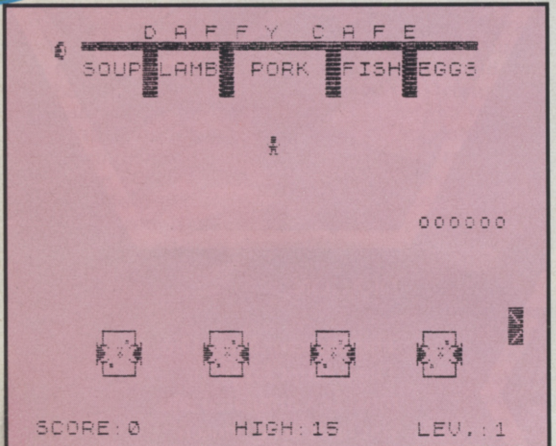
Trade Enquires Welcome

by Adam Bull
for SPECTRUM

"Ees no good, Mr Fawlty. Ees too much! The trolleys, they chase me. The customers, they get angry and change the order. The feet they throb from running. An' you say the game she has 13 levels? Aargh! I go crazy!"
You'll have to excuse him, he's from Barcelona.



```
  5 REM * © BY ADAM BULL 1984 *
  10 RANDOMIZE : LET hi=0: PRINT
 "PLEASE WAIT...": FOR x=0 TO 10
3: READ a: POKE USR "a"+x,a: NEX
T x
  20 PRINT PAPER 2; INK 6; FLASH
 1;AT 20,0;"PRESS A KEY:"I" FOR
INSTRUCTIONS": IF INKEY$="" THEN
 GO TO 20
  30 IF INKEY$="i" THEN GO SUB 3
000
  40 LET d=0: LET l=1: LET sc=0:
 LET m$="": LET w2=0: GO SUB 100
0
  50 LET me=1: LET x$="☺": LET x
=6: LET y=15: LET xx=x: LET yy=y
  60 LET w1=3: LET w3=1: DIM y$(
4,4): LET t$="⁑⁑⁑⁑"
  70 IF d THEN FOR u=1 TO 10↑30:
 PRINT AT 6,4;""d" to go on "q"
to quit": GO TO 120
 100 FOR u=1 TO 20: PRINT AT x,y
;x$: IF xx<>x OR yy<>y THEN PRIN
T AT xx,yy;" "
 110 LET xx=x: LET yy=y: LET x=x
+(INKEY$="6")-(INKEY$="7"): LET
y=y+(INKEY$="8")-(INKEY$="5"): L
ET z=ATTR (x,y): IF z=23 OR x<0
OR y<0 THEN LET x=xx: LET y=yy
 120 IF z=32 THEN GO SUB 500
 130 IF INKEY$="q" THEN GO TO 70
0
 140 IF INKEY$="d" THEN LET l=l+
1: LET sc=0: PRINT PAPER 2; FLAS
H 1; INK 6;AT 21,0;"  SCREEN DEM
ONSTRATION   LEV.:  ";AT 21,30;l
: LET d=1: GO TO 820
 150 IF z=57 THEN GO SUB 600
 160 IF z=77 THEN FOR a=1 TO 10:
 BEEP .002,50: BEEP .002,51: NEX
T a: LET sc=sc+75*l: PRINT AT 21
,6; PAPER 2; INK 6;sc
 170 IF z=59 OR w1=y AND x=8 AND
 w2>0 THEN GO TO 700
 180 IF'me=7 THEN GO TO 800
 190 IF w2 THEN PRINT AT 8,w1;"
"; INK 3;AT 8,w2;"Ħ": LET w1=w2:
 LET w2=w2+w3: IF w2=28 THEN LET
 w3=-w3
 200 IF w2=3+(13 AND l>4) THEN L
ET w3=-w3
 210 NEXT u: FOR w=1 TO 4: IF t$
(w)<>"⁑" THEN LET t$(w)=CHR$ (CO
DE t$(w)-1)
 220 PRINT AT 17,(w-1)*7+5;t$(w)
: IF t$(w)="0" THEN GO TO 700
 230 NEXT w: IF RND*20<L+4 THEN
BEEP .02,40: LET w=INT (RND*4+1)
: LET t$(w)="9": LET v=INT (RND*
5): LET y$(w)=("SOUP" AND NOT v)
+("LAMB" AND v=1)+("PORK" AND v=
2)+("FISH" AND v=3)+("EGGS" AND
v=4): PRINT AT 17,(w-1)*7+5;t$(w
);AT 20,(w-1)*7+4; PAPER 2; INK
7;y$(w)
 240 PRINT AT 11,5;" ";AT 11,5;
PAPER 2; INK 7;("▬" AND RND>.45)
 250 IF l>7 THEN PRINT AT 6,2;"
";AT 6,2; PAPER 2; INK 7;("▮" AN
D RND>.63)
 260 GO TO 100
 500 REM * TAKE A MEAL *
 510 BEEP .02,30: LET m$=("SOUP"
 AND y<7)+("LAMB" AND y>7 AND y<
12)+("PORK" AND y>12 AND y<19)+(
"FISH" AND y>19 AND y<24)+("EGGS
" AND y>24)+""
 520 LET x$="☺": IF m$<>"" THEN
LET x$="☻"
 530 PRINT PAPER 2; INK 7;AT 10,
14;m$+("    " AND m$="")
 540 LET x=xx: LET y=yy: RETURN
 600 REM * DROP A MEAL *
 610 LET t=1+(y>8)+(y>15)+(y>22)
 620 IF m$=y$(t) THEN LET me=me+
1: LET y$(t)="    ": LET m$="":
LET t$(t)="⁑": BEEP .01,20: BEEP
 .01,24: LET sc=sc+15*l: PRINT A
T 17,(t-1)*7+5;"⁑";AT 20,(t-1)*7
+4; PAPER 2; INK 7;"    ";AT 21,
6; INK·6;sc;AT 10,23+me;"o": GO
TO 520
 630 GO TO 540
 700 PRINT AT xx,yy;" ";AT x,y;
FLASH 1;"*";AT 20,0; PAPER 2; IN
K 6;"<<<<<<< YOU HAVE FAILED! >>
>>>>>": FOR x=40 TO 25 STEP -1:
BEEP .1,x: BEEP .1,x+1: BEEP .1,
x-1: NEXT x
 710 IF sc>hi THEN LET hi·=sc
 720 GO TO 20
 800 REM * NEW LEVEL *
 810 PRINT FLASH 1;AT 6,10;" * B
ONUS! * ": LET l=l+1: FOR x=1 TO
 30: BEEP .01,20+x: LET sc=sc+5:
 PRINT PAPER 2; INK 6;AT 21,6;sc
;AT 21,30;l: NEXT x
 820 PRINT AT 6,10;"
";AT 20,0; PAPER 2; INK 7;"
                               ": GO
 SUB 1030
 830 IF l>2 THEN LET w2=3+(14 AN
D l>4): IF l>3 THEN PRINT PAPER
2; INK 7;AT 10,8;"▬▬▬▬";AT 9,21;(
"▬▬" AND l>6);AT 11,22;("▬▬" AND
 l>7);AT 6,2;("▮" AND l>7); PAPE
R 7; INK 0;AT 6,2;(" " AND l>6)
 840 FOR x=0 TO l: PRINT INK 3;A
T INT (RND*3+13),INT (RND*28+2);
"☺": NEXT x
 850 IF l>5 AND l<10 THEN FOR x=
1 TO l-2: PRINT INK 3;AT INT (RN
D*4+4),INT (RND*26+3);"Ħ": NEXT
x
 860 IF l>9 THEN PRINT AT 4,2;"
";AT 5,2; PAPER 2; INK 7;"
                       "+(" " AND l
>10)
 870 IF l>11 THEN PRINT INK 3;AT
 13,2;"☺-☺-☺-☺-☺-☺-☺-☺-☺-☺-☺-☺-☺
-☺-"+("☺" AND l>12)
 880 GO TO 50
1000 REM * PICTURE *
1010 BORDER 2: PAPER 2: INK 7: C
LS
1020 PRINT INVERSE 1;AT 15,31;"\
";AT 16,31;"/"; INVERSE 0; INK 6
;AT 0,2;"      D A F F Y  C A F E
";AT 21,0;"SCORE:0         HIGH:";h
i;TAB 25;"LEV.:1".
1030 INK 0: PAPER 7: FOR x=2 TO
8: PRINT AT x,3;"
                ": NEXT x
1040 FOR x=9 TO 11: PRINT AT x,8
;"    ";AT x,21;"    ": NEXT x
1050 FOR x=12 TO 19: PRINT AT x,
1;TAB 31: NEXT x
1060 FOR x=4 TO 25 STEP 7: PRINT.
 INK 1;AT 16,x;"┌─┐";AT 17,x;"▓⁑
▓";AT 18,x;"└─┘": NEXT x
1070 PRINT PAPER 4;AT 1,3;"▬▬▬▬▬▬
▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬";AT 2,3;"S
OUP▮LAMB▮ PORK ▮FISH▮EGGS";AT 3,
3;"     ▮     ▮      ▮     ▮     "
1080 FOR x=1 TO 10: PRINT AT x,0
+(x>3 AND x<7);" "+(" " AND (x=3
 OR x=7)): NEXT x: PRINT AT 10,1
;"     ";AT 11,5;" ";AT 1,1; PAP
ER 1; INK 5; BRIGHT 1;"●"
1090 PRINT PAPER 2; INK 0;AT 10,
25;"000000": RETURN
```

DAFFY CAFE

SET MENU

Program notes

5 — left 8 — right
6 — down 7 — up

(If you don't like the cursor keys, then the controls can be changed by altering line 110.)

Any capital letters which are not obviously part of a word or sentence are user-defined graphics characters. These are in lines 50, 60, 190, 210, 520, 620, 840, 850, 870, 1060, 1080, 3080.

A

x,y

l
sc
hi
t£

s£(4

m£

w1,w

me

x£

z

u

xx,y

v,w,e

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A LA CARTE

Variables used

x,y — co-ordinates of waiter during the game
l — current level
sc — total score
hi — high score
t£ — countdowns shown on the tables
s£(4,40) — meals on order
m£ — meal you are carrying
w1,w2,w3 — used for manic tea trolley
me — number of meals delivered
x£ — picture of waiter (with or without a meal)
z — ATTR of place you want to move to
u — used for loop in the main game
xx,yy — used for saving the old x,y values
v,w,etc — general purpose variables

```
2000 REM * CHARACTER DATA *
2010 DATA 0,0,31,16,16,16,16,144
,0,0,255,0,0,0,1,1
2020 DATA 0,0,248,8,8,8,136,137,
188,226,240,248,248,240,226,188
2030 DATA 0,20,0,8,20,8,0,0,61,7
1,15,31,31,15,71,61
2040 DATA 145,17,16,16,16,31,0,0
,128,128,0,0,0,255,0,0
2050 DATA 9,8,8,8,8,248,0,0,28,2
8,28,73,62,28,20,54
2060 DATA 28,92,252,73,62,28,20,
54,255,66,126,66,126,66,231,231
2070 DATA 14,30,57,61,61,57,62,1
4
3000 REM * INSTRUCTIONS *
3010 BORDER 7: PAPER 7: INK 0: C
LS
3020 PRINT INK 1;" Welcome to th
e DAFFY CAFE.."' INK 0'"You take
 the part of a waiter ina busy c
afe.At intervals each ofthe tabl
es will order a meal andyou must
 deliver it before they become a
ngry and get you fired. Each tab
le will wait for a countof nine
(shown on the table) forits meal
 before getting angry."
3030 PRINT '"The ordered meal is
 displayed  under the table."''
"To pick up a meal you move up
 against the appropriate counter
 in the kitchen (To change a mea
lsimply move up against another
 counter),and to deliver a meal
 you move against the required
 table.   PRESS ANY KEY"
3040 IF INKEY$="" THEN GO TO 304
0
3050 CLS : PRINT "You cannot del
iver the wrong    meal to a tabl
e, so look out in case they chan
ge their minds!"''"Extra points
will be awarded if you wash your
 hands in the gentscloakroom to
the left of the     cafe."
3060 PRINT '"The meal you are ca
rrying will  be displayed in the
 centre of   the screen."''"Use
the cursor keys to steer    your
 waiter."''"Mind out for drunks
and manic    tea trollies, which
will kill   you.   PRESS ANY KEY
"
3070 IF INKEY$="" THEN GO TO 307
0
3080 CLS : PRINT "🯅     is the wa
iter (you)"'' INK 1;"┌.┐";TAB 0;
"▙:▟"; INK 0;" is a table"; INK
 1;TAB 0;"└▪┘"'' INK 3;"🯅"; INK
0;"     is a drunken man"'' INK 3
;"♖"; INK 0;"     is a manic tea
trolly"'' PAPER 1; INK 5;"◙"; PA
PER 7; INK 0;"     is the washbas
in"
3090 PRINT ''"There are more tha
n thirteen     different levels t
o pass through"''"Press "d" afte
r start for demo  of the other l
evels; "q" to quit"''"Good luck.
.."''"PRESS ANY KEY TO BEGIN"
3100 IF INKEY$="" THEN GO TO 310
0
3110 RETURN
```

No.3

RIVER RAID (Activision)

ONE WAY DOWN THE RIVER OF DEATH

YOU CAN easily imagine professional fighter pilots turning pale and mumbling excuses when faced with Carol Shaw's *River Raid.* On the face of it, a suicide mission if ever there was one. This is a one-way river all right.

You are, collectively and individually, the pilot(s) of five low-flying, heavily armed marine attack aircraft, and your mission is to fly at nought feet up an endless branching fjord filled with the paraphernalia of war. Battleships steaming to and fro; fuel tankers; tanks; helicopters; jet aircraft and of course a series of bridges, each of which you must take out before you can continue your breakneck low-level mission.

Your mission is, simply, to blast as much as you can.

Isn't it always?

Nought feet is very low. You can fly over *nothing* and when objects in your path — like oddly nimble battleships — move to intercept you, you must either dodge or blow them away — because if you don't you fly smack into the side, pal, and that's where you lose one of the five-man team. Other hazards include mobile AA that shoots at you from the banks and bridges — the width of the banks varies amazingly, the River getting narrower the further you ascend it — and the unexpected appearances, after about Bridge 7, of phantom-like jet fighters.

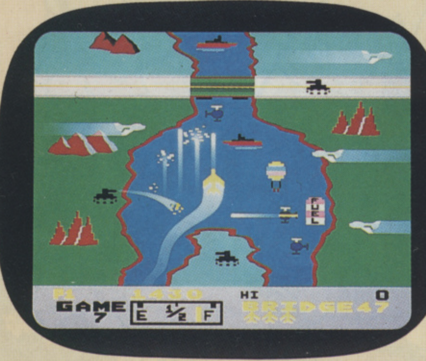
Later still you get the fast helicopter gunships.

TRAPPED AT ZERO FEET

You measure your ascent by bridges. These are the only regular feature in a fjord-like configuration that branches endlessly into islands and sub-waterways, some of these very narrow indeed. Sometimes these channels will be filled by enemy vehicles; at other times they will be empty save for the striped fuel tanks.

The fuel, embarrassingly, is collected by flying over it. (Oh well.) You keep track of your tank state by means of a gauge, and bells sound when the fuel gets low.

And get this. No matter what gets in your way — what unlikely or totally credible combination of enemy war machines should appear — you can *never* rise above nought feet. So to help you manoeuvre out of what can look like impossible situations, your attack plane has massive air brakes that enable it to pull hi-G turns, as well as afterburners for that often-needed last-minute burst of speed.



Your armament, thankfully, seems infinite. A regular stream of armour-piercing rockets pours away with satisfying speed. Warships, beetle-like wandering helicopters, stationery fuel dumps . . . all disintegrate on the instant when clobbered by these magnificent air-to-ground missiles, so powerful that even bridges disintegrate on impact.

The earliest bridge-to-bridge killing zones are the easiest. Ships lie stationary and choppers hover dully, like bored flies. All fall prey to your jinking low-level fighter, flaps full on, pulling hi-G zigzags from bank to bank, blasting the enemy's property into scrap, and flying blithely through the tumbling ruins. Fuel dumps are common as muck, and as your fuel is still high you blast these contemptuously, content to collect the few lousy points they represent. The first bridge can be taken out at leisure — you even have time to pick off a couple more helicopters before flying through into the next open reach of River.

By now the defences are waking up and things are starting to happen. A great cruiser pulls into your path just as you approach; a swift salvo and he vanishes in flame, but now here is a helicopter doing the same. A quick shot — he goes down — and a *swerve* past another chopper . . . a shot at a fuel dump . . . another, which misses, at a battleship — and you're past the first wave of defences and faced with a choice of routes.

The arm on the right is narrower, and involves a tighter turn to enter, but is relatively free from enemy, and moreover possesses two unguarded fuel dumps. (We are beginning to need fuel.) The one to port is wider, but more thickly peopled with enemies.

SCORES, AWARDS AND MORE...

You hesitate too long, attempt the right-hand arm of the river, blow the turn, and pile into the island cliff. One down.

Next man starts from the last bridge passed. Pretty soon you are at Bridge Seven, and the enemy jets have showed up.

They come in fast, from left to right (or the other way around), pale blue ghosts that come right at you and can only be downed by good deflection shooting — and if not downed must be dodged by skilled flying. Avoiding them, you come into range of the banks, where mobile AA starts firing. They get your range very quickly, so if you see them landing salvoes ahead but in line . . . change your line fast. If you see them on the bridge, blast the bridge.

You can score very highly indeed at *River Raid.* There are reports of a million being scored. Certainly Carol Shaw's game, designed for and marketed by the US company Activision, has all the ingredients of compulsiveness. It is one of the very best — if not *the* best — of the vertical scrollers; the *Defender* of Up-and-down Land.

The game appeared originally in the UK early last year as an Atari VCS ROM, having already won countless awards from the US Game industry. Last Christmas it turned up as a ROM for Atari computers.

It is, of course, as we said, and as they always are, a suicide mission. Sooner or later your fuel gives out, or you misjudge a tight turn, and fly smack into something. Then it's over and you're left with a score which won't go halfway to telling the full story of all the sweat and terror of your last mission up the River of Death.

TONY TYLER

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BK 7/84

HARDWARE REVIEW

NOT EXACTLY YOUR GARDEN OF EDEN

Does the Coleco Adam live up to its hype? TONY TYLER tells all

THE COLECOVISION ADAM was launched with a tremendous amount of brouhaha last summer, at the Chicago Consumer Electronics Show. Easily the most glitzy of all the incredibly glitzy stands, the Coleco operation featured half-hourly showings inside a smoke-filled booth wherein lasers played over face and body of a whole team of blondes who each delivered a setpiece spiel. Every now and again said blonde would delicately touch a slim, elegant ivory-coloured keyboard with a single red-painted talon.

This, we were told (at half-hourly intervals), was the Coleco *Adam*. The CBS-affiliated monster, having in the previous two years wiped the floor with the dedicated videogame opposition, was now unveiling its all-in-one machine designed to clean up the Stateside home computer market.

What we were looking at was a mockup — nothing new in that of course. And boy! Did it look promising! Slimline detachable keyboard, revibed stringy-floppy data storage system AND a printer. We never saw the data storage doing its stuff, and we never got to see or hear the printer in operation. But who cared? The whole package was going to retail before last autumn at about $600. At that price, and if everything worked, within 18 months or so the *Adam* would undoubtedly be THE system for the US domestic computer revolution.

It was also games-based; you could actually use *Colecovision* ROMS as well as stringy-floppy versions of top arcade games.

Time passed.

Adam didn't arrive on schedule. Again, nothing new in that, as we all know. But over here we began to hear rumours. Coleco, it was said, had blown it badly. The system was late, the price was now considerably higher (above $1000) and, worst of all, there were major deficiencies in the package.

Still, it *had* looked good. This writer at least reserved judgment.

Until now.

The version of *Adam* we here at BIG K finally received was the *Module 3* version, different to the standalone *Adam* inasmuch as the package — data storage, keyboard and *SmartWriter* printer — comes as a plug-in expansion to the existing Coleco video games console. As a result its footprint is truly colossal.

Switching on — the main power switch is sensibly placed behind the printer — puts you into electronic typewriter mode. Hitting the ESCAPE/WP key gives you the built-in wordprocessor.

Taking these first: the keyboard is good-looking and poised at a pleasant angle. The keys themselves are chunky and positive. In fact, the only really irritating fault is the lack of an LED to tell you when Shift or Control Lock is on (also the weird duplication of keys, such as Backspace and Cursor-left, which perform identically so far as I can see). The real trouble is with the software and the printer.

Typing in electonic typewriter mode is an awsome and infuriating business, made unbearable by the unbelievable noise of the daisywheel printer. I've heard it described as "like bamboo tearing". To me, it closely resembles the evening song of the AK47s as the Druze and Phalange militiamen blast the wotsits out of each other in Beirut. Living with this printer in your home would be a nightmare. And it's SLOW; when you're on-line (in typewriter mode) the pistol shot of each printer stroke comes about half a second after you've typed the character in question, which is fantastically disorientating.

Moving into wordprocessor mode, you see on-screen the rather childish and archaic platen roll icon (your working area) embellished by six labels each representing a function for the six function keys (constantly redefined — rather like Apricot's microscreen but not half so elegant) However, useless amenities aside (like changing the colour of the screen from Nasty to Horrible) it does work, even if it is slow and childish. In fact, it's a pretty good toy wordprocessor.

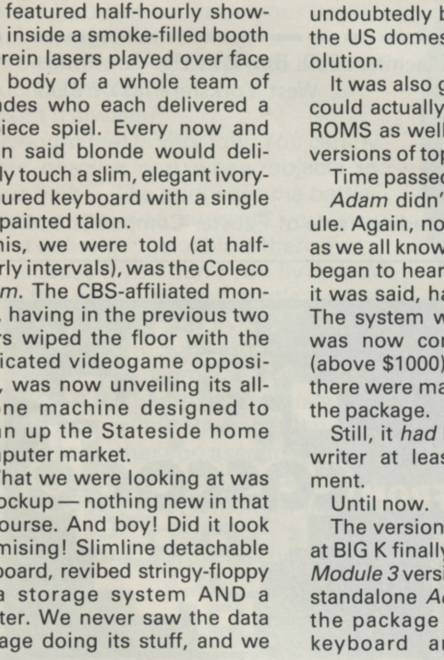
Adam is a Clean Machine in terms of built-in languages. *SmartBasic* (for which read *Applesoft*) loads in via the unusual high-speed (it says here) stringy-floppy arrangement. Eventually it appears and you can start programming. As I said, no surprises with the Basic itself; its pretty comprehensive and at least half-way to being structured. Maximum four-colour resolution is 256*159 (HG with four lines of text, HG2 without). Which is not exactly scintillating — but by using USR routines I assume you can bodge a higher degree of resolution than that.

Colours are pure Coleco — vivid, not to say lurid, and quite easily accessible with the COLOR= statement. The full palette is 16, which is better than most.

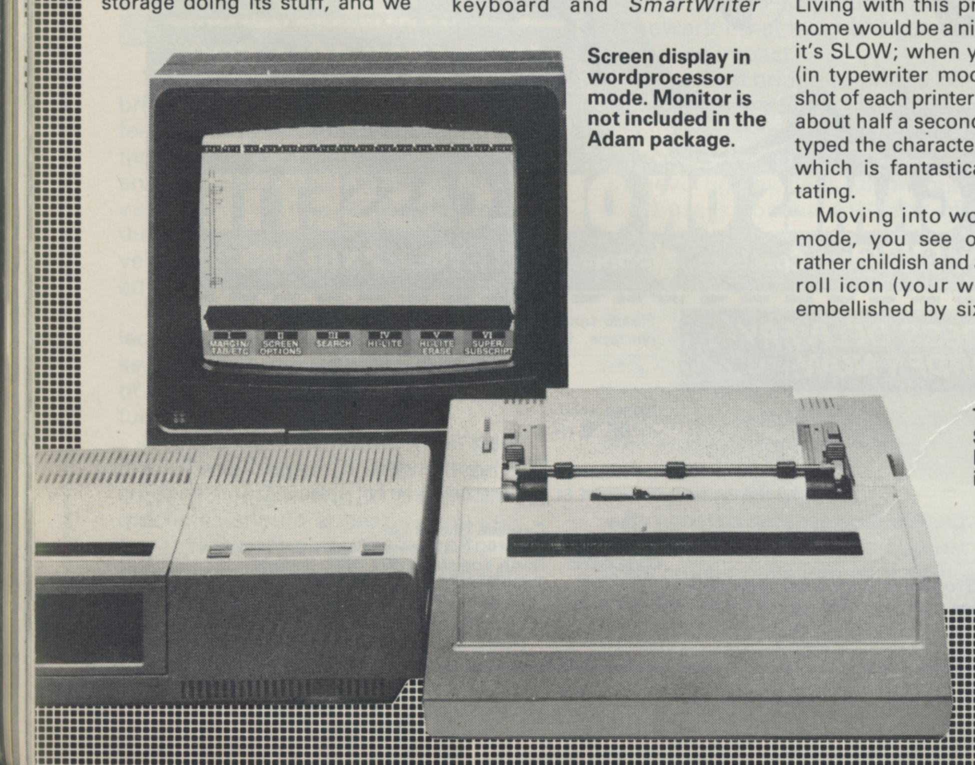
What *is* profoundly irritating is the lack of user RAM in Basic. 80K, you've heard? Well, surely that must mean at least a genuine 64? Load Basic, type PRINT FRE(O) and you get 25 and a half K's to play with. Again, not bad compared with some machines, but far, far less than advertised.

VERDICT

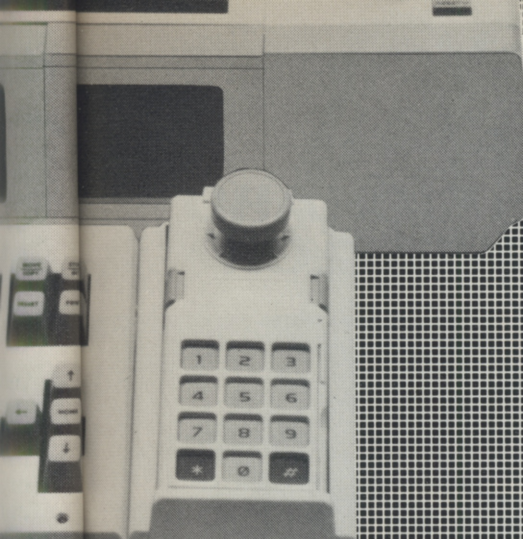
ONE DOESN'T want to come down too heavily on this computer. Unfortunately you can't always have what you want. Definite plus points are the keyboard, which in the main is elegant, easy to use and well-furnished with dedicated keys, including six function keys. Commands like PRINT, DELETE, etc. can be handled via these keys, usually involving a planned



Screen display in wordprocessor mode. Monitor is not included in the Adam package.



The infamous SmartWriter. Ear protection is advised.



sequence of strokes with an abundance of ARE YOU SUREs sprinkled at each stage. The adaptation of the Coleco keypad controller to serve as a numeric keypad is economic, though the *Adam's* ivory colour scheme and the jet black of the game console don't go too well together (and the joystick is virtually impossible to use when clipped down). The keyboard *is* detachable.

And that's about it on the plus side.

Against the machine are: the pitiful RAM (pitiful when compared with what should be available, that is); the unbelievably ghastly printer, the slowness of the data storage unit — and little touches like the fact that (so far as I can see) you can't clear the screen in Basic without switching off (I'm sure I must be wrong about this but the manual was no help). Associated with this is the way in which a LIST command, in graphics mode, only gives you two lines at a time. To see the list you have to clear out the graphics, and to do this you've got to reset. (Tell me I'm wrong, Coleco.)

All in all the Coleco *Adam* is a major disappointment. Final price for the standalone version had (at time of writing) not been fixed, but seems likely to be in the £600-700 range. That is just simply too much when you consider that for the same money you could have a BBC B plus disc drive plus one of the cheaper monitors.

What Coleco did hit upon was the 'music centre' approach, with as many pieces in one budget package as possible. The same idea has clearly occurred to Amstrad, who now offer a genuine 64K, a monitor and orthodox cassette storage for half the *Adam's* price.

Rumour now has it that the *Adam* is bombing out in the States. I'm not surprised. Will it do any better over here? I'd be very surprised indeed if it did.

Sorr-ee . . .

LET'S GET FIZ-ICAL...

RICHARD TAYLOR gets to grips with Primordial Peripheral's disc drive for the 48K Spectrum.

I SUPPOSE IT WAS inevitable that someone, sooner or later would come up with a proper disc drive for the Spectrum. Even though Sinclair have launched their famous *Microdrive*, its distinct lack of availability (now being eased by limited shop sales) and relatively slow access speed (compared to a real disc system) have prevented its domination of the Spectrum mass storage system market.

There is something of a price gap, however, because the 'real disc system' under examination here will set you back nearly £250; close to the cost of two new 48K Spectrums, the only model this drive will work with.

The **FIZ** system (**F**loppy disc drive and **I**nterface for the **Z**X Spectrum, would you believe) comes in two units; the drive itself and, connected by 50cm of ribbon cable, the interface box which plugs into the back of the Spectrum.

The interface contains quite a large assortment of chips powered by an extra voltage regulator — there to ease the load on the Spectrum's already overworked and overheated internal regulator. The disc unit (a *Shugart* for those who must know) has a separate mains connection, so you may need a 2-way mains adaptor if you're suffering from 'clogged-up' power sockets . . . and what hacker isn't these days? The 9 volt plug from the Spectrum's own power supply goes into the back of the interface box, the old socket being concealed by the interface.

Switch on and the disc whirrs into life. Instead of the usual Sinclair copyright line the screen clears with the message **FIZZ S3/540.4 OPERATING FIRMWARE © 1983 Macronics Systems Ltd.** There's no loading or saving of the DOS (Disc Operating System) from tape as the necesary software is held in an EPROM.

On power up the contents of the EPROM is transferred to the top 4K of the Spectrum's RAM. With a further 4K being used by the DOS for temporary storage, the top 8K of RAM is technically rendered unusable.

This could've been a major drawback to the system, making useless many programs that rely on that top 8K for certain functions. However, Primordial supply a formatted-disc that carries a special program called 'lodos'.

The program is called up by the command **dos**, thus the instruction **PRINT USR** dos transfers the DOS from high to low memory. Pretty neat.

The DOS itself relies heavily on BASIC variables and **USR** calls. After switching on the Spectrum the variables **as, bs, cs, dir, back, al, bl, cl, zap** and **nd** are initialised to the addresses of machine code routines in the DOS. So, for instance, **PRINT USR dir** gives a list of what is on the disc — as well as an indication of the amount of storage capacity and the main disc title. The **USR** statement returns the number of any error that might have occurred and there is a comprehensive and helpful set of error codes.

The DOS has facilities to save and load BASIC programs, machine code programs (there's an auto-run facility for machine code) and arrays. It is also possible to format new discs, erase files or make back-up copies of discs. Some commands need filenames or other parameters passed to them. This is done by assigning the BASIC variable **f$** with the name before typing in the **USR** statement. For instance, **LET f$="Graph": PRINT USR bs** saves a BASIC program onto a disc called "Graph". The commands can be used equally as well in programs as they do as direct commands.

The drive uses single-sided, single density discs; each one capable of 109K of user-available storage. A disc is formatted using the **nd** command.

One of the 40 tracks on the disc is used by the DOS to store the directory, leaving the user with 39 tracks; each one with a capacity of 2816 odd bytes. One of the idiosyncracies of the system is that a file will occupy at least a complete track even if it is only a few bytes in length — therefore placing a maximum limit of 39 files per disc.

The actual operation of the disc was extremely fast and reliable. The documentation, although brief, was adequate and well presented.

The **FIZ** system represents value for money if you use your Spectrum for program development or for some sort of data handling. I suspect, however, that the majority of users do not desperately need the added flexibility (and expense) of a proper disc system and would probably do better with a *Microdrive.*

The system will come into its own when more software is available to run on it. Some games material is available but, as I said, the price tag makes the **FIZ** a games system in the 'executive toy' class. Primordial have recently announced a word processing disc (based on the old 'Tasman' WP) and have an assembler in the works.

FIZ costs £249.95 from **Primordial Peripherals Ltd., 89 Herne Road, Bushey, Herts. WD2 3LP.** The interface unit can be bought as a separate item for use with other disc drives, price £79.95.

TAYLOR-MADE GRAPHICS

By RICHARD TAYLOR

THE SPECTRUM MANUAL makes no mention of animation or movement, as if it is an area of computer science so unimportant and trivial that it is beneath its notice. Anybody who has seen any arcade-type games on the Spectrum would obviously realise that this is not the case: quite the reverse. Animation and character movement is probably the most important function of any microcomputer — let alone our trusty friend the Spectrum. What would all those Space Invaders, Pac-Men and so on be like if they were utterly motionless?

The movement that can be procured by the use of Sinclair BASIC can hardly be any competition to the marauding groups of fierce aliens elegantly transported around the screen with the use of breathtakingly fast Z80 Machine Code. Fear not because BASIC can equip you with some quite respectable animation if used to its full potential.

By utilising every last idiosyncracy and short cut of BASIC for the sake of pure speed it is possible to produce animation programs written solely in BASIC which do not smack too highly of its slow speed.

The biggest problem with BASIC is that it does not possess any commands specifically designed with movement in mind. To emulate such commands requires a strange and complicated assortment of PRINT commands, perhaps with the inclusion of the odd colour statement or two.

The usual method of creating movement while using BASIC is to print the object on the screen, wait a while, erase the object by overprinting it with a space character, update its position in a certain way and then go back to the first stage — rather cumbersome but the only real solution. A simple program to perform such a task is as follows:

```
10 LET a=0: REM initial column
20 PRINT AT 10,a;"*": REM Print Character
30 PAUSE 10: REM Wait a bit
40 PRINT AT 10,a;"  ": REM Erase character
50 LET a=a+1: GO TO 20: REM Update position
```

An asterisk plods along horizontally from the right to left and eventually disappears off the screen leaving the computer to impertinently reply with the error message "B Integer out of range".

By changing the value of the PAUSE statement residing at line 30 it is indeed possible to change the speed at which the object moves. Removing it altogether gives the asterisk a fair amount of speed, but remember we are only moving one object and not doing anything else besides that one menial task. The next short routine bounces a ball (or rather the letter 'O') around the screen — a more interesting movement.

```
10 LET x=16: LET y=11
20 LET a=1: LET b=-1
30 PRINT AT y,x;"O"
40 PAUSE 3
50 PRINT AT y,x;"  "
60 LET x=x+a: IF x>31 OR x<0 THEN LET a=-a: GO TO 60
70 LET y=y+b: IF y>31 OR y<0 THEN LET b=-b: GO TO 70
80 GO TO 30
```

Here the updating section is a lot more complicated and involves checking if the object has violated the boundaries of the screen and, if so, changing its direction.

You may notice the flicker that is beginning to creep into the program. This results from the fact that the object is blanked out and therefore not present on the screen for a comparatively long time due to the added complexity of the position updating part of the program. To overcome this problem it is best to make the program remember the old position of the object before finding out what the new one is going to be, then the old position can be blanked out just before the new one is printed, giving the impression of continuous motion.

Not we have come to something a little more tricky; moving more than one object around the screen at a time. Below is a modified version of the bouncing ball routine which is able to cope with the strains of such animation:

```
10 INPUT "Number of objects?";num
20 DIM x(num): DIM y(num)
30 DIM a(num): DIM b(num)
40 FOR n=1 TO num
50 LET a(n)=1: LET b(n)=-1
60 LET x(n)=RND*31: LET y=RND*21: NEXT n
70 FOR n=1 TO num
80 LET oldx=x(n): LET oldy=y(n)
90 LET x(n)=x(n)+a(n): IF x(n)>31 OR x(n)<0 THEN LET
a(n)=-a(n): GO TO 90
100 LET y(n)=y(n)+b(n): IF y (n)>21 OR y(n)<0 THEN LET
b(n)=-b(n): GO TO 100
110 PRINT AT oldy,oldx;"  "
120 PRINT AT y(n),x(n);"O"
130 NEXT n
140 GO TO 70
```

This program utilises arrays to store the co-ordinates and direction of each of the objects and uses a FOR/NEXT loop to update the positions of each of the objects in turn. Notice how the old position of each object, in turn, is held in (oldx,oldy) while the new position is calculated. The old position can then be overprinted immediately before the object is re-printed, avoiding any flicker. You can demonstrate the sluggish speed of BASIC if you enter a biggish number when the computer prompts you for the number of objects that are to be moved.

One of the biggest problems with Sinclair BASIC is that you are restricted to printing in the character grid of 32 columns and 22 rows. To produce smooth moving graphics you need to be able to make full use of the Spectrum's high resolution capabilities and be able to print anywhere on the high resolution grid of 256 × 176 pixels. Next month I will be presenting a short machine code program to do just that. I'll also be looking at much more complicated subjects such as acceleration and complex movement patterns.

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for ORIC
by KEVIN FREEMAN

```
1 CLS:POKE618,10:HS=0
10 GOSUB1000
14 M=34:N=2:X=12:Y=23:Z=X:C=Y
16 PAPER4:INK7:CLS
18 FL=1750:MS=200:SC=0:SS=76:HH=16
20 PLOT0,0,16:PLOT0,1,16
22 PLOT38,0,20:PLOT38,1,20
24 A2$="ahija":B2$="   g"
26 A3$="  k":B3$="olmno"
30 FORI=16TO26:PLOT0,I,18:NEXT
32 FORI=3TO26:PLOT1,I,3:NEXT
34 PLOT21,0,1:PLOT21,1,5
36 PLOT1,0,4:PLOT1,1,6
100 REM......CONTROL..................
102 REPEAT:SOUND4,40,6:PLAY0,7,7,0
110 Q$=KEY$
112 IFQ$=""THENGOTO150
115 IFQ$=","THENX=X+2
120 IFQ$="."THENX=X-2
125 IFQ$="Z"THENY=Y-2:HH=HH-1
130 IFQ$="A"THENY=Y+2:HH=HH+1
145 IFQ$=" "THENGOSUB400
150 GOSUB200
152 FL=FL-1:IFFL<0THENFL=0
155 PLOT2,0,"FUEL    :"
156 PLOT11,0,RIGHT$("    "+STR$(FL),4)
160 PLOT22,0,"SCORE   :"
162 PLOT31,0,RIGHT$("    "+STR$(SC),4)
165 PLOT2,1,"MISSILES:"
167 PLOT11,1,RIGHT$("    "+STR$(MS),3)
170 PLOT22,1,"HI-SCORE:"
175 PLOT31,1,RIGHT$("    "+STR$(HS),4)
178 IFMS<20THENPLOT1,1,12
180 IFFL<100THENPLOT1,0,12
181 PLOT20,0,8:PLOT20,1,8
185 IFMS=0THENFL=0
190 UNTILFL=0
195 PLAY0,0,0,0:GOTO700
200 REM
205 PLOTZ+2,C-1," "
210 PLOTZ,C,"     "
215 PLOTZ,C+1,"      "
220 A1$="  d":B1$="abeca"
225 C$=" "
240 X=X-INT(RND(1)*3):X=X+INT(RND(1)*3)
250 Y=Y+INT(RND(1)*2):Y=Y-INT(RND(1)*2)
260 IFX>33THENX=33
262 IFX<2THENX=2
264 IFY>23THENY=23
266 IFY<3THENY=3
268 IFY<8THENA1$=A2$:B1$=B2$:C$="f"
270 IFY>13THENA1$=A3$:B1$=B3$
272 PLOTX+2,Y-1,C$
274 PLOTX,Y,A1$
275 PLOTX,Y+1,B1$
280 Z=X:C=Y:FL=FL-1
284 PLOT16,6,"[¦]":PLOT16,16,"[¦]"
286 PLOT11,11,"[-":PLOT22,11,"-]"
288 IFHH>25THENHH=25
289 IFHH<5THENHH=5
```

Ah, Roger, Oric base. Have the rogue bird in my sights. Understand need for direct hit to engine port to down enemy. Intelligence briefing showed effects of attack on other parts of rogue negligible. Beginning my run now. Fuel and missiles should just get me through. Ah, this is Thunder 5 — wish me luck…

```
290 PLOT0,HH,18:PLOT0,HH-1,20
300 RETURN
400 REM.....MISSILES....
401 GOSUB200
402 PLOT17,6,"+":PLOT17,16,"+"
403 PLOT12,11,"+":PLOT22,11,"+"
404 SOUND4,11,9
405 FORJ=26TO14STEP-3
410 PLOTM,J,"\"
415 PLOTN,J,"/"
420 PLOTM,J," "
422 PLOTN,J," "
424 M=M-3:N=N+3
425 NEXT
430 M=34:N=2:FL=FL-1:MS=MS-2:SS=SS-2
432 IFSCRN(16,J)=98THENGOSUB600
435 PLOT17,11,"p"
440 SOUND4,40,6:PLAY0,7,7,0
450 PLOT17,J," "
499 RETURN
600 REM.........HIT.......
601 SOUND4,10,0:PLAY0,7,5,4
605 PLOTX,Y,"  pp  "
606 PLOTX,Y+1,"p p p "
610 WAIT15:SOUND4,3500,0
615 PLOTX,Y,"p p p"
620 PLOTX,Y+1," p pp"
625 WAIT15:PLAY1,7,5,7
630 PLOTX,Y,"      "
635 PLOTX,Y+1,"       "
645 WAIT15:SOUND4,30000,0
650 SC=SC+150+SS
655 IFHS<SCTHENHS=SC
660 SS=75:X=27:Y=20
665 PLAY0,7,7,0
699 POP:RETURN
700 REM......END OF GAME........
705 PLOT12,8,"DISENGAGE"
708 WAIT150
710 CLS
715 PAPER0
720 PRINTCHR$(12):INK1
730 PRINTCHR$(4);CHR$(27)"J          FIGHTE
R ":PRINTCHR$(4)
```

```
 740
WAS:'
 750
 AGAI
 755
 760
 780
 790
 100
 113
XT
 113
 113
 113
 113
 113
 114
 114
```

FIGHTER

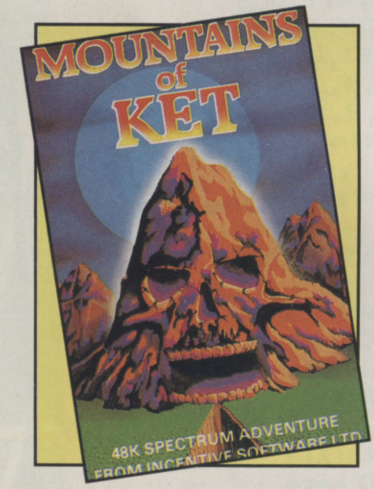
TRIED & TESTED BIG K GAMES

```
 740 PRINT:PRINT:PRINT:PRINT"YOUR SCORE
WAS:";SC
 750 PRINT:~~PRINT:PRINT~~"PRESS-'Y  TO PLAY
 AGAIN"
 755 PRINTSPC(6);"'N' TO STOP"
 760 REPEAT:Q$=KEY$:UNTILQ$="Y"ORQ$="N"
 780 IFQ$="Y"THENGOTO14
 790 END
 1000 REM
 1130 FORI=46856TO46983:READW:ROKEI,W:NF
XT
 1131 DATA0,0,0,0,63,63,0,0
 1132 DATA0,0,3,3,63,63,0,0
 1133 DATA0,0,48,48,63,63,0,0
 1134 DATA0,12,12,12,12,63,12.12
 1135 DATA30,63,63,51,33,33,18,12
 1146 DATA0,0,0,0,0,12,12,12
 1147 DATA63,30,12,12,0,0,0,0
```

```
 1148 DATA0,0,1,0,63,63,7,1
 1149 DATA12,12,63,18,33,33,33,18
 1150 DATA0,0,32,0,63,63,56.,32
 1151 DATA12,12,12,30,18,18,63,63
 1152 DATA1,7,63,63,0,1,0,0
 1153 DATA59,59,59,59,13,55,18,30
 1154 DATA32,56,63,63,0,32,0,0
 1155 DATA0,0,63,63,0,0,0,0
 1156 DATA36,8,0,33,8,0,1,0
 1200 PRINT:PRINT:PRINT
 1201 PAPER0:INK1
 1205 PRINTSPC(12)CHR$(4);CHR$(27)"NFIGH
TER":PRINTCHR$(4)
 1210 PRINT:PRINT"SHOOT DOWN AS MANY ENE
MY AIRCRAFT"
 1215 PRINT"AS YOU CAN BEFORE YOU RUN OU
T OF FUEL"
 1220 PRINT"OR MISSILES"
 1230 PLOT12,14,"CONTROLS"
 1235 PLOT12,16,"UP...(A)"
 1240 PLOT12,17,"DOWN.(Z)"
 1245 PLOT12,18,"RIGHT(.)"
 1250 PLOT12,19,"LEFT.(,)"
 1255 PLOT12,20,"FIRE.(SPACE BAR)"
 1260 PLOT10,10,"PRESS SPACE TO START"
 1270 W$=KEY$
 1275 IFW$=" "THENCLS:RETURN
 1280 GOTO1270
```

ALL YOU NEED IS

CURRENTLY causing much consternation on the Big K campus is a deceptively tricky adventure called *Mountains of Ket,* from Incentive Software, which runs on a 48K Spectrum. This traditional text-only epic is the first of a proposed trilogy set in the mythical land of Ket, a familiar-sounding suburb full of Orcs, Ogres and other routine 'Obgoblins.



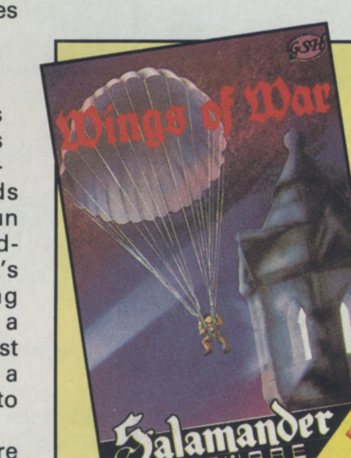
It boasts both a commendably strong plot and a pot full of puzzles that run a gamut of difficulty. Apparently Ket, long troubled by feuding warlords and the like, has been thrust into uncharacteristic unity by some attacks from beyond the mountains; the work, it seems, of a band of mad, marauding monks. You've been summoned by the Lords of Ket to sort these beggars out. Some task! To ensure that you at least try to complete this hazardous mission, the Lords have kindly grafted Edgar, an assassin bug, into your neck. Try and do a bunk and the little devil will sink his poisoned pegs into your tender parts.

Despite the standard Sword & Sorcery format, *Ket* offers up a number of refreshing twists. Take the opening sequence f'rinstance. As you saunter into the local village it's a fair bet that most players, conditioned by the senseless slaughter of similar games, will draw their swords and begin hacking away at the earliest opportunity. Here, however, such antisocial behaviour reaps its own rewards. The inhabitants will, as a man, set about you with ill-disguised glee. Better by far to sheathe your sword and attempt to barter. There are a number of items that can be bought, all of which will prove of use once you've entered the mountains. Although it must be said that with what appears to be a village inhabited solely by grumpy pensioners ("Speak up sonny, I'm a little deaf!" and "I've no time for idle chatter!" being typical replies) it's extremely tempting to swing that sword and remove a few heads.

Although primarily a puzzle adventure the game features an effective combat routine based on the Dungeons and Dragons slugger system. Upon starting the game you'll be allocated points for Prowess, Energy and Luck, and these, come a punch-up, are compared against the statistics of your opponent. The 'puter then plays out the battle in a series of rounds. You're given a running commentary on the slashes and thrusts along with opportunities to either dodge or run. It's an effective and well presented routine that adds considerable punch (no pun intended) to the proceedings. As a general rule it's best to avoid crossing swords with those with a higher prowess rating. Just swallow your pride and do a runner; that way you'll get to see more of the game.

I'm currently stuck before a wall which I'm told is in 'mint condition'. The clue here is presumably 'Polo', so obviously (?) there's a hole in the wall somewhere. Just a question of sussing out where, I guess . . .

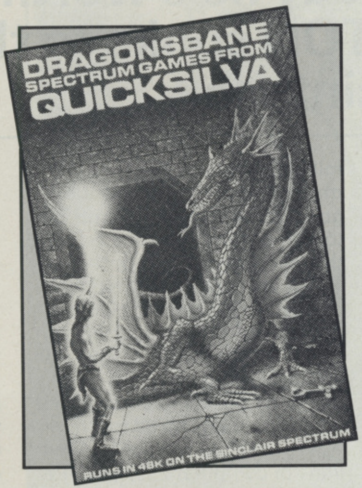
NOW SHOULD you be tired of all this *D&D* style adventuring Salamander Software offer an entertaining alternative in the shape of *Wings of War* (which runs on the Dragon 32/64). Set in France, circa WW2, you get to play an officer in some sort of secret task force who's (been) volunteered to infiltrate an occupied chateau. Apparently the krauts (no offense chaps) have developed a secret weapon and the Brits want it. The mission begins with a descent by parachute



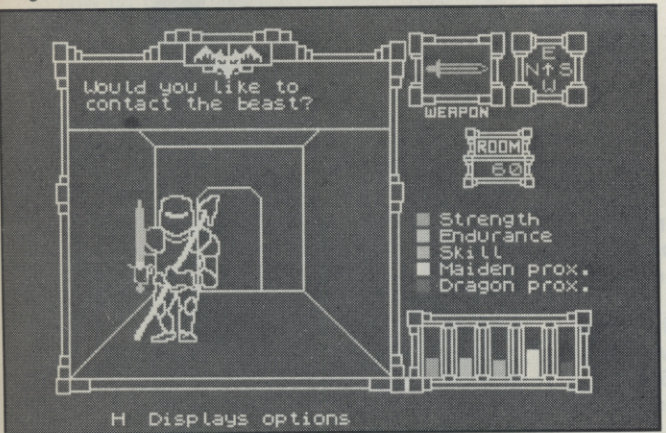
into the wood near the chateau. Unfortunately a rough landing scatters your equipment as you land. Not the best of omens.

Wings is a text adventure using a formatted display. On the left hand side of the screen is a description of your current location and on the right a list of all the items you're currently carrying. There's also a turn count and direction guide as well as a small scrolling input window. The adventure itself is pretty friendly. There seem to be no sudden death routines (thank goodness) and quiet humour abounds. While exploring one of the floors in the chateau I found myself in the commandant's office. Thinking quickly I typed in SAY HEIL HITLER and was dutifully awarded with a security pass. I then turned on my heels and promptly walked into a large cupboard. The commandant was only mildly amused. *Wings* is spiffing stuff and a sequel entitled *The White Cliffs of Dover* is promised soon.

I MUST confess to being generally nonplussed by the recent spate of hybrid arcade adventures. The likes of the chart-bustin' *Atic Atac* fall between too many stools for my taste. However, *Dragonsbane* (which runs on a 48K Spectrum from Quicksilva) is enormously impressive. It's a 'true' graphical adventure that thankfully doesn't involve zapping everything that moves, although I must confess that the plot is a little ho-hum. Trapped within Castle Earthstone you must outwit the dread Dragon Lords and rescue the beautiful Princess Paula. Still the hoary old story is more than compensated for by a stylish presentation.



You move through the castle's great halls using the cursor keys, picking up artefacts and battling such hideous adversaries as vampires, ghouls and (shriek) giant pigeons. There are 172 locations to visit and 40 species of well-drawn monster to avoid, not to mention a brace of randomly generated trapdoors. It's a true graphic adventure.


Would you like to contact the beast?

H Displays options

WHAT DO YOU THINK?

FINALLY, if you have any favourite adventures why not write in and tell us (a) what they are, and (b) why you like them. Perhaps you've unearthed some curious bugs you can share or maybe you're just plain stuck somewhere! Whatever the reason, write in. We wanna hear from you.

SLOVE and a Polo

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7. NEW Both EOR and TRANSFER plotting of sprites to the screen are available.
8. NEW A SPRITE LIBRARY has sprite designs ready for use in your programs with 'books' such as 'GHOSTS' and 'MEN'.
9. SPRITE POSITION COORDINATE VARIABLES which are reset automatically by the control coding if the sprite crosses a screen boundary. As you move your designs, the 'old' images left behind are deleted automatically as well.

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N.B. Disc version may be bought on cassette for transferral to disc.

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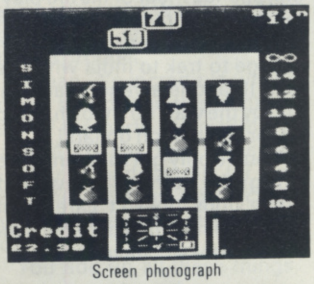
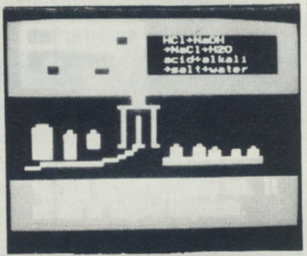
"You would be fully justified in claiming that it is better than the real thing" — M. Field, Oxford.



Screen photograph

NEW CASTAWAY @ £8.95 for the BBC 32K, Electron
£11.95 on disc The Three Island Adventure

A beautifully designed adventure with a wealth of puzzles of logic, imagination and wit. Tackle beanstalks, irate gardeners and prigish chemistry teachers! Brilliant use has been made of sound and Mode 7 graphics with full screen pictures. Set in varied terrain, from sanddunes to mansions, the adventure provides an exciting range of locations through which the castaway must pass in search of priceless treasure and cryptic clues.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JOBS: Now the

STEVEN JOBS, along with a partner, founded Apple Computer ten years ago. Today he's worth a quarter of a billion dollars. PAUL WALTON spoke to the Man behind the trail-blazing Macintosh.

STEVE JOBS sold his VW Beetle car and cancelled a visit to India back in '75 to start Apple Computer with his mate, a boffin called Steve Wozniak (featured in April issue of BIG K). It paid off. Apple's now a billion-dollar company and he owns about a quarter of it.

While it was Wozniak's idea to build the Apple II — that's since sold two million around the world — Jobs came up with the next bright idea. He's the man credited with bringing *mice* cursors, multiple *window* screens and *icons* — or visual representations of objects first to the Lisa and now to the cheaper Macintosh.

'I believe in giving people great products as cheaply as possible,' bubbles Jobs, as he outlines the 'goodies' up-and-coming from Apple in the near future. (See the box.)

Steve is twenty-eight years old, spends most of his life playing with computers, or improving his tennis. He dropped out of college to trek to India when he was 18 and is a vegetarian. Oh, and by the way, he's worth going on for 250 million dollars!

You've only got to listen to the things he says to know that Steve Jobs doesn't care what people think. Thanks to his success, he doesn't have to . . .

About promoting the Mac: 'If we could get a picture of the Queen using one, hell, I'm sure they'd sell. We're not a slogans company. Mac is supposed to be the computer for the rest of us, but royalty might help . . .'

IBM want to crush us — they want us dead!

About IBM, his major rivals: 'If it wasn't for us IBM would own all the PC market, though they don't deserve to. IBM just want to crush us — they want us dead!'

On computers generally: 'Most are just a load of junk. The game in computers is now over — software, games and leisure software, business packages, graphics . . . that's where it's at today. I wouldn't build an Apple II today, I'd write a neat piece of software.

'We think there have been two standards in our industry — and that's all. The Apple II in '77 and the IBM PC in '81. The whole industry is converging on those two. We think that the Apple II operating system is a standard. There are more of them out there than any other computer in the world.

'As you know, last year we achieved approximately $1000 million revenue. That was primarily Apple II. But if we're going to be the major contributors in our industry and remain that throughout this decade — which we absolutely want to do — then we'll need $10 billion.

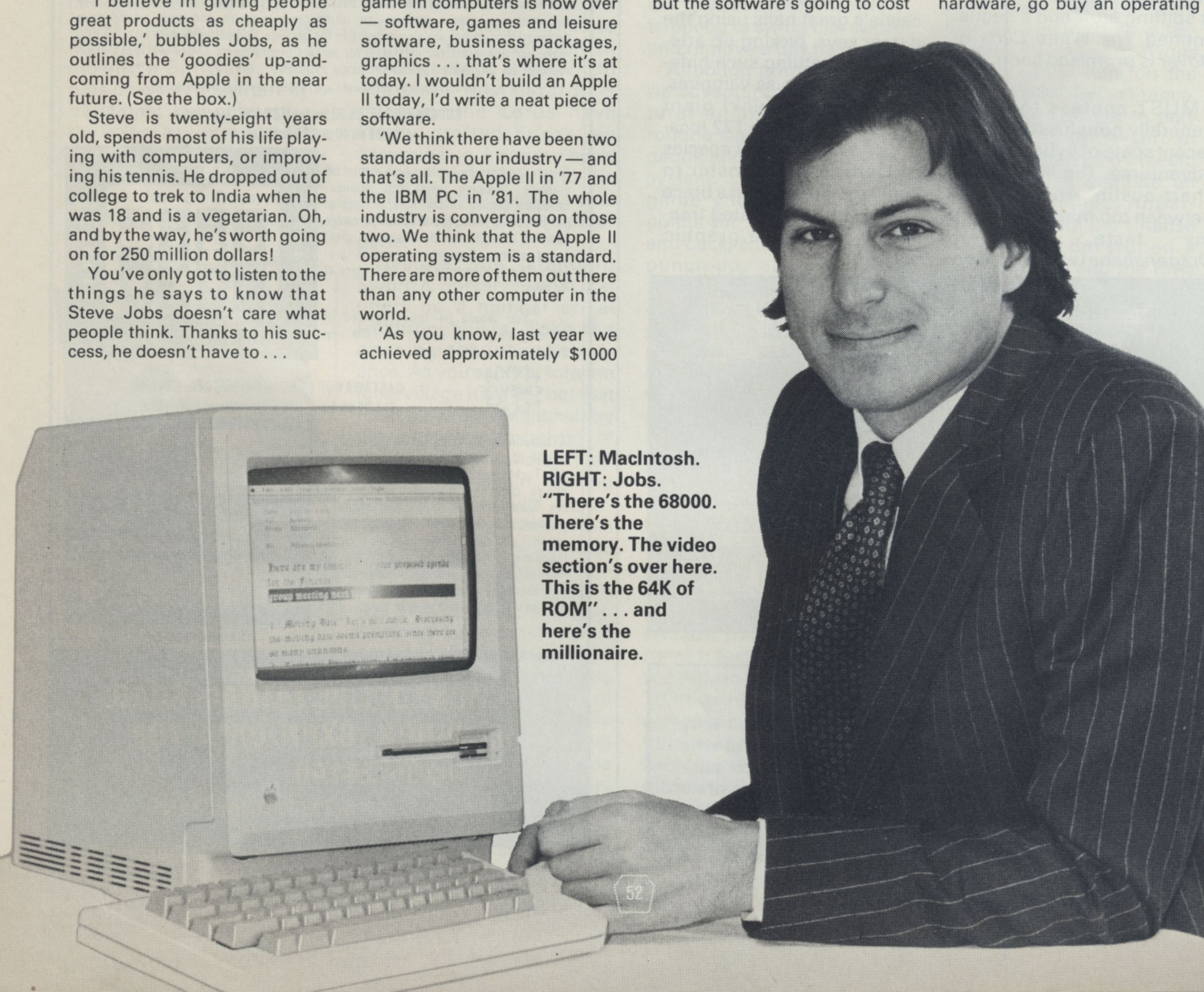
'But we aren't going to sell ten billion dollars worth of Apple IIs a year. The next major growth is going to be the Mac and that type of very advanced machine.

'We want to sell tens of millions of computers per year. Per year!' he emphasised. 'These PCs won't resemble those we use today. They'll be sold for a few hundred pounds, will have immense storage and processing power and great graphics . . . but the software's going to cost a fortune. Expect to pay twice as much for a good package as you do today.'

But Jobs doesn't think that most other computer suppliers will be around anyway. He thinks that by *next year* there'll only be the Apple II or the IBM PC selling in volume for businesses, or for the US home market. And then we'll see the age of the dream machine, like his Mac, which offer something a little different.

Most computers are a load of junk

The end of the PC as we know it, in 1984? 'Sure. Other people just slap together some randon hardware, go buy an operating



LEFT: MacIntosh. RIGHT: Jobs. "There's the 68000. There's the memory. The video section's over here. This is the 64K of ROM" . . . and here's the millionaire.

e good news...

system from this or that person, languages from that same guy. They get a piece of junk. Which is what everyone's computer is. But IBM's going to kill most everybody out there. Between them and us there won't be anything else to choose from.'

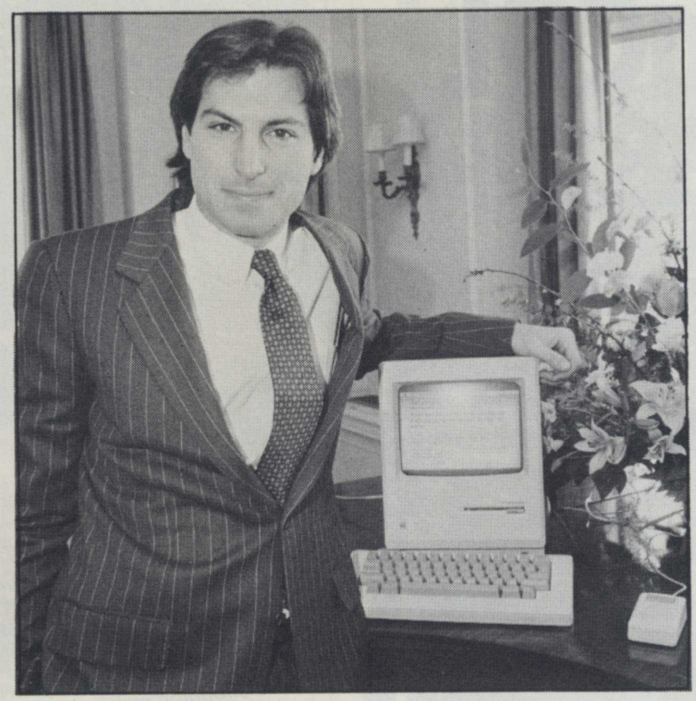
Jobs puts this all down to money — to being able to spend vast sums in developing and building cheap PCs. 'Remember that Apple are a $1000 million corporation — so are IBM — in terms of personal computers. And there are things that megacorporations can do that other people can't. Like we are spending over $100 million this year on marketing, about $100 million on R&D. As is IBM.

'So if we all spend that money wisely how is anybody going to catch up with the Mac or whatever developments IBM has? They're not. So you see both companies are accelerating their investments in those two areas, not pulling back. And all this money, all those PCs already sold, allow Apple and IBM to do something unique.'

SOFTWARE, OR the ability to control its production, 'will be critical in 1984,' says Jobs. 'You have to conceive hundreds of software developers to write for your computers. Now these guys don't have the resources to write software for everybody's machines. So they're going to pick one or two. If they make the wrong decision — they'll be out of business.

'So how do they make their decision? One simple criterion — installed base. And maybe not what it is today, but what will it be in a year. It's the only way that they can make money. There are only two computer companies that have installed base, IBM and Apple.'

What does all this mean for games houses? Jobs reckons that it means a choice between the mass-market, and ultimately cheaper name-brand machines which IBM and Apple will flog in the millions. 'Other people aren't going to be able to run the software that's developed for our machines — it'll be very difficult. People don't quite realise it yet, but it's going to be quite apparent this year,' he said.



There isn't much love lost between Apple and IBM. 'The IBM PC was the fourth personal computer they developed. So if that was the best of four . . . IBM has never been a product innovator. Their strategy is to corner the marketplace in what they do best — which is service, support and motherhood.

'In the States there's a battle for hearts and mind that's going on between Apple and IBM. They just want to wipe us off the face of the earth. I think that that's not going to happen. They could buy us — but we're not for sale. We've been having too much fun. We're the only ones that are going to survive IBM — I really do think that! They're just going to crush everybody else.'

We're not for sale — we've been having too much fun

So, how does Apple plan to stay ahead? 'We don't design products that market research studies say we should design, that's for sure,' says Jobs. 'That's ridiculous. That's the IBM way!'

'We said that if we shipped 15,000 Macs in the first 100 days we'd be doing very well. It's been 65 days now — how many Macs do you think we've shipped? We've shipped over 40,000 — it's unbelievable. No computer start-up's ever been like this, ever, ever, ever,' enthused Jobs.

But what's the reception been like in America? And does he use it himself?

'My problem is that I have a Mac at home — but I'm never there. You can't sell forty thousand of something in sixty days without some real use for it. It doesn't happen. We sell 'em $2500 retail, so that's $80 million — over a million dollars a day.'

What Apple did with Macintosh was to build a graphics-based machine cheaply, one which works by moving icons around the screen rather than juggling Basic commands in your head!

Jobs is so proud of his Mac that, half-way through the interview, he whips out the motherboard and gives BIG K a technical, guided tour . . . 'This is the complete Macintosh digital section,' he explains. 'This is the complete 32-bit graphics processing digital computer on one board.

'There's the 68000. There's the memory. The video section's over here. This is the 64K bytes of ROM. A lot of custom VLSI is in these ROMs. We also have a custom VLSI Disc Controller chip. This is an incredible serial chip which gives up 2 megabits per second serial channels out of the back. Here's the extra disc port. We have a full serial mouse, and a serial keyboard. We have a clock calendar with parameter memory that is battery backed-up. We have four voice sound and speech built into the product.

'I mean, it's incredible what's on this board. And this is 20 per cent of the parts of an IBM PC. An IBM PC has five times the number of parts and is far less powerful. It does not include many of the features of this board.

'You add up all these things, and the number of companies that can do all of them — or even half of them — is only one. That's IBM. And the question is, when will they do it? The answer is, I don't know. I think it'll be two or three years away.'

APPLE'S NEXT PRODUCTS

This year Apple will launch new members of the Apple II family ('We're spending as much on R&D for the Apple family as we are on the Mac in 1984'), as well as major peripherals and software.

A luggable Apple IIe is coming. 'Really hot stuff — something to keep ACT up nights,' with 256K of memory for under $1,000. But that's just the beginning for the old 6502-family. There is a 512K Apple IIe being built with futher extended Apple DOS which will be truly portable, due for release in 1985.

The Apple II is getting more of the Mac-like features, or windows and icons, to go with the mouse cursor just added. 'We can give Apple II owners a taste of what is to come, and it will be fun.'

It has also been rumoured that Steve Wozniak, lately returned to Apple, is working on a project codenamed Apple V — a hard disc Apple II to match the IBM PC.XT.

In time there'll be a fully portable Mac. 'I want to put Macintosh inside a book in three years, or before, with a flat screen display, mass memory chips . . . that's one of the reasons we chose a three and a half inch disc drive. It's very small, uses less power. It weighs less. The whole thing might one day fit into a shirt pocket.'

There will be a portable laser printer for under $5000 (or around £3000), for the first time being 'standalone' and capable of working with any make of PC, which Jobs describes as 'an incredible breakthrough in laser printing'. 'It prints anything to high definition at a speedy eight A4 pages a minute. It's just awesome.'

And there will also be the launch of APPLEBUS, Apple's local area network

And on the software front? 'We have two programming languages that we're working on — also be out in the summer — Pascal and Basic,' said Jobs. 'You'll use windows, be able to incorporate graphics in your program. Universities have been going wild at that. Microsoft has their own Basic output — ours is substantially better. You can write a whole bunch of programs at once.'

All you need is imagination . . . this issue's BIG KOMPETITION gives you everything else you need to start computing!

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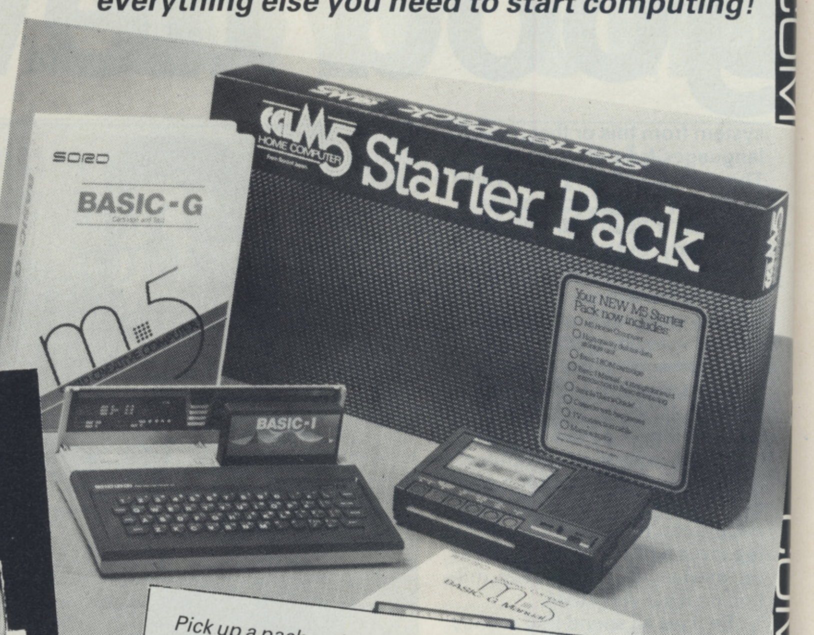

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No shopping around for bits and pieces, you just plug it in and you're away.

The M5 is a great computer for beginners (check out the features below) and BIG K's top prize comes complete with a 'Basic-I' Introduction to Programming cartridge AND the acclaimed 'Basic-G' Special Graphics Programming cartridge. Enter the competition now — we've only got one of these fantastic M5 Starter Packs to give away.

RULES

There is no entry fee but all entries must be on a proper printed coupon cut from BIG K and must bear the entrant's own name, age and address.

Every accepted entry will be examined and the First Prize awarded to the entrant who, in the opinion of the judges, has shown the most skill and judgment in placing the listed factors in the order of appeal to a novice computer user. Remaining prizes will be awarded for the next best entries in order of merit. No entrant may win more than one award.

In the event of a tie or ties for any prize(s) then a further test of skill will be conducted by post between tying competitors to determine the eventual winner(s) or winning order.

All prizes must be accepted as offered. If any winner is aged under 18 then parental consent must be provided before the prize can be awarded.

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The judges' decision and that of the Editor in all other matters affecting the competition will be final and legally binding. No correspondence can be entered into.

The competition is open to all readers in Great Britain, Northern Ireland, Eire, the Channel Islands and Isle of Man except employees (and their families) of IPC Magazines Ltd., the printers of BIG K or of Computer Games Limited.

All winners will be notified and the result published later in BIG K.

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How to Enter

Listed below are eight features of the M5 with 'Basic-G' cartridge, all factors which help make this computer so exciting to use. All you have to do is place them in the order you consider they would most appeal to a novice computer user.

Write the key letters of the eight factors — in ink — in the spaces on the entry coupon. For example, if you think that "screen buffers for animated graphics" would be the most appealing then put 'D' in the first space. The letter of your next choice goes in the second space, and so on for all eight.

Complete the coupon with your name, age and address and post your entry to: BIG K CGL COMPETITION, 55 EWER STREET, LONDON SE99 6YP, to arrive by the closing date — Tuesday 31st July 1984.

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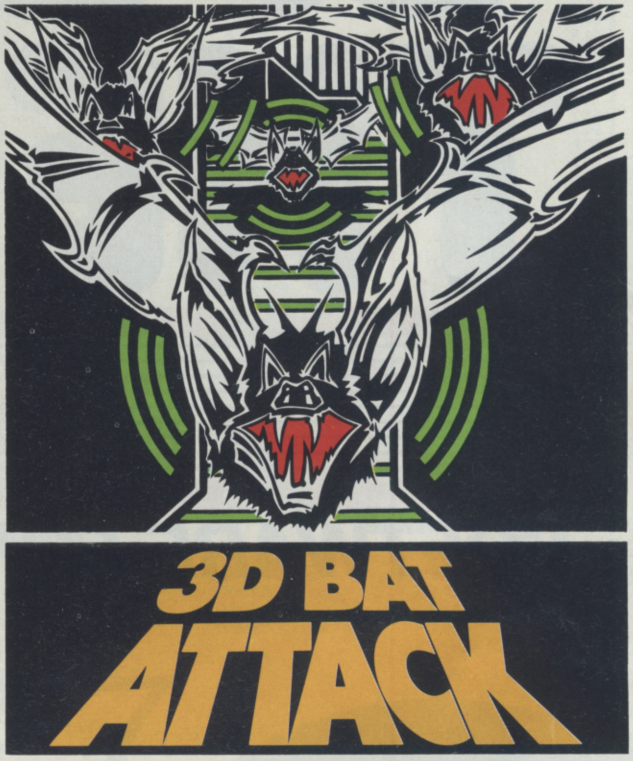

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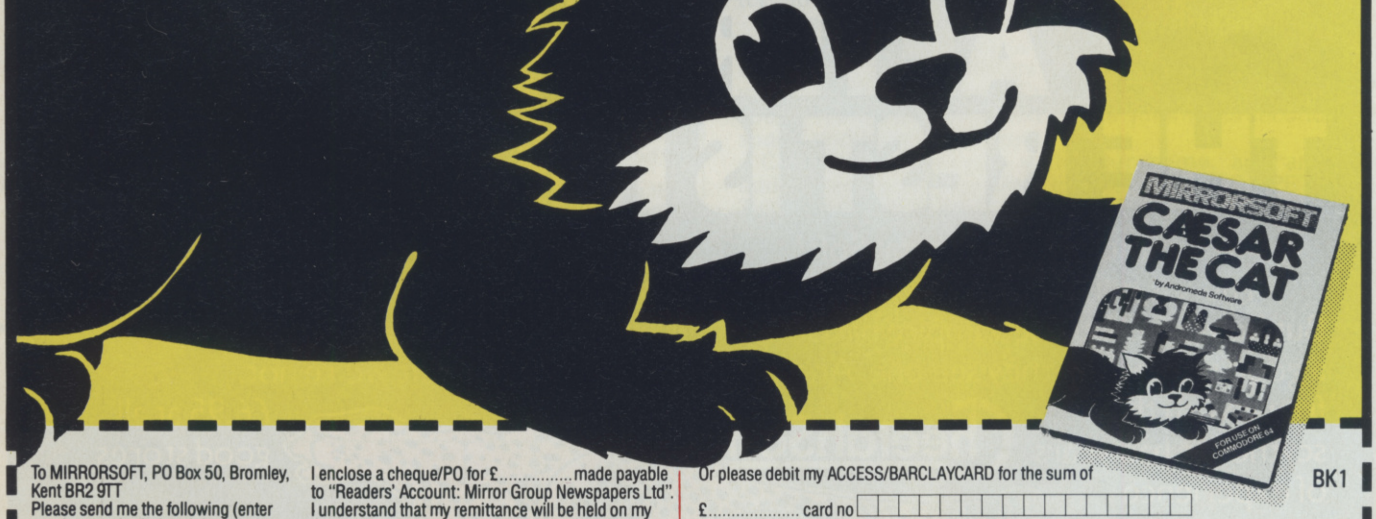

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HERO WANTED

To undertake seemingly impossible rescue mission deep within the bowels of the Earth. No pay. Long hours. Mind-bogglingly hazardous work. Precious little chance of survival. Interested?

Only real heroes need apply.

Designed by John van Ryzin
for the Atari 2600,
Atari home computers,
Colecovision, Commodore 64
cassette and disk.

H·E·R·O.

ACTIVISION.

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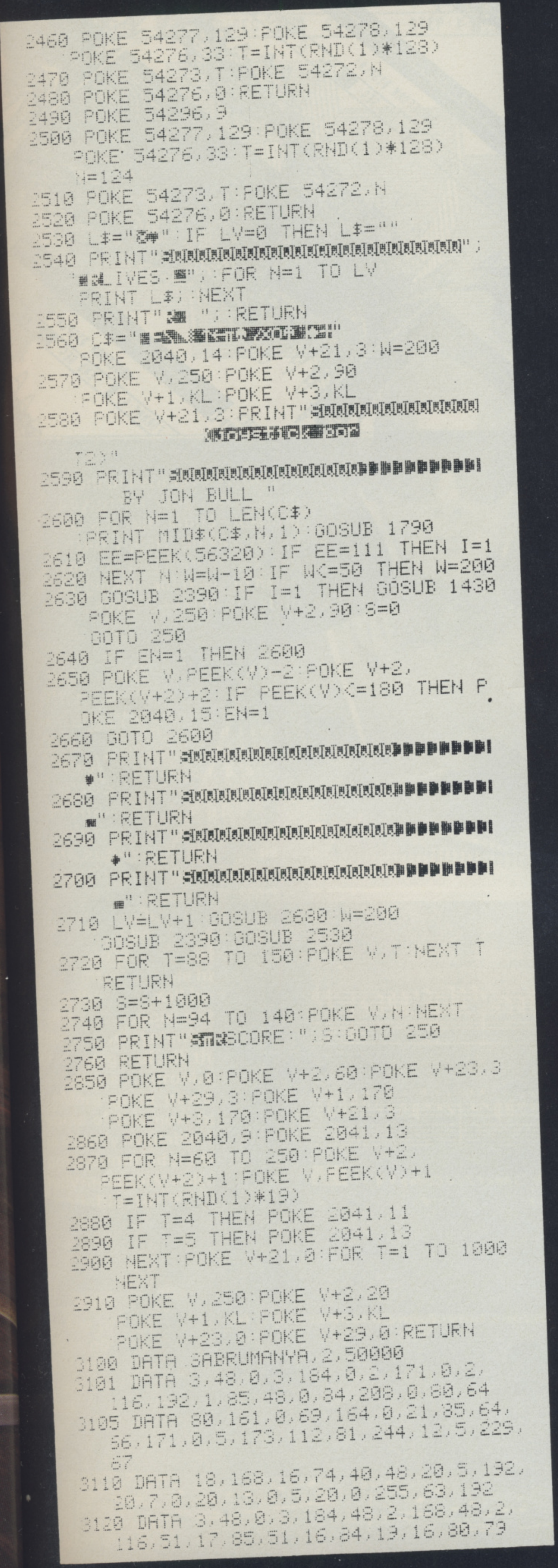
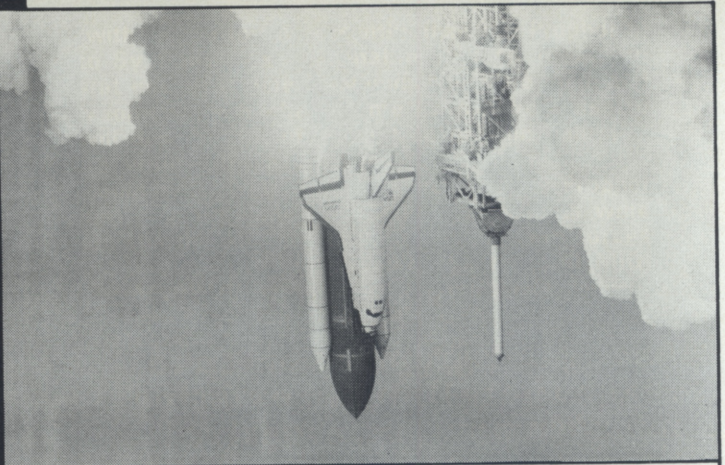
DUEL! continued from page 14



```
2460 POKE 54277,129:POKE 54278,129
   POKE 54276,33:T=INT(RND(1)*128)
2470 POKE 54273,T:POKE 54272,N
2480 POKE 54276,0:RETURN
2490 POKE 54296,9
2500 POKE 54277,129:POKE 54278,129
   POKE 54276,33:T=INT(RND(1)*128)
   N=124
2510 POKE 54273,T:POKE 54272,N
2520 POKE 54276,0:RETURN
2530 L$="▮▮":IF LV=0 THEN L$=""
2540 PRINT"SQQQQQQQQQQQQQQQQQQQQQQ";
   "▮▮LIVES ▮";:FOR N=1 TO LV
   PRINT L$;:NEXT
2550 PRINT"▮▮ ";:RETURN
2560 C$="▮▮▮▮▮▮▮▮▮▮▮▮▮▮!"
   POKE 2040,14:POKE V+21,3:W=200
2570 POKE V,250:POKE V+2,90
   POKE V+1,KL:POKE V+3,KL
2580 POKE V+21,3:PRINT"SQQQQQQQQQQQQQQ
              ▮▮▮▮▮▮▮▮▮▮▮▮

   T2)"
2590 PRINT"SQQQQQQQQQQQQQQQ]]]]]]]]]
       BY JON BULL "
2600 FOR N=1 TO LEN(C$)
   PRINT MID$(C$,N,1):GOSUB 1790
2610 EE=PEEK(56320):IF EE=111 THEN I=1
2620 NEXT N:W=W-10:IF W<=50 THEN W=200
2630 GOSUB 2390:IF I=1 THEN GOSUB 1430
   POKE V,250:POKE V+2,90:S=0
   GOTO 250
2640 IF EN=1 THEN 2600
2650 POKE V,PEEK(V)-2:POKE V+2,
   PEEK(V+2)+2:IF PEEK(V)<=180 THEN P
   OKE 2040,15:EN=1
2660 GOTO 2600
2670 PRINT"SQQQQQQQQQQQQQQQQQ]]]]]]]]]
   ▮":RETURN
2680 PRINT"SQQQQQQQQQQQQQQQQQ]]]]]]]]]
   ▮":RETURN
2690 PRINT"SQQQQQQQQQQQQQQQQQ]]]]]]]]]
    ▮":RETURN
2700 PRINT"SQQQQQQQQQQQQQQQQQ]]]]]]]]]
    ▮":RETURN
2710 LV=LV+1:GOSUB 2680:W=200
   GOSUB 2390:GOSUB 2530
2720 FOR T=88 TO 150:POKE V,T:NEXT T
   RETURN
2730 S=S+1000
2740 FOR N=94 TO 140:POKE V,N:NEXT
2750 PRINT"S▮▮SCORE:";S:GOTO 250
2760 RETURN
2850 POKE V,0:POKE V+2,60:POKE V+23,3
   POKE V+29,3:POKE V+1,170
   POKE V+3,170:POKE V+21,3
2860 POKE 2040,9:POKE 2041,13
2870 FOR N=60 TO 250:POKE V+2,
   PEEK(V+2)+1:POKE V,PEEK(V)+1
   T=INT(RND(1)*19)
2880 IF T=4 THEN POKE 2041,11
2890 IF T=5 THEN POKE 2041,13
2900 NEXT:POKE V+21,0:FOR T=1 TO 1000
   NEXT
2910 POKE V,250:POKE V+2,20
   POKE V+1,KL:POKE V+3,KL
   POKE V+23,0:POKE V+29,0:RETURN
3100 DATA SABRUMANYA,2,50000
3101 DATA 3,48,0,3,184,0,2,171,0,2,
   116,192,1,85,48,0,84,208,0,80,64
3105 DATA 80,161,0,69,164,0,21,85,64,
   56,171,0,5,173,112,81,244,12,5,229,
   67
3110 DATA 18,168,16,74,40,48,20,5,192,
   20,7,0,20,13,0,5,20,0,255,63,192
3120 DATA 3,48,0,3,184,48,2,168,48,2,
   116,51,17,85,51,16,84,19,16,80,79
```



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£500 SPENDING MONEY!
plus
A trip to the Kennedy Space Centre!

We'll be revealing all next month. In the meantime . . .

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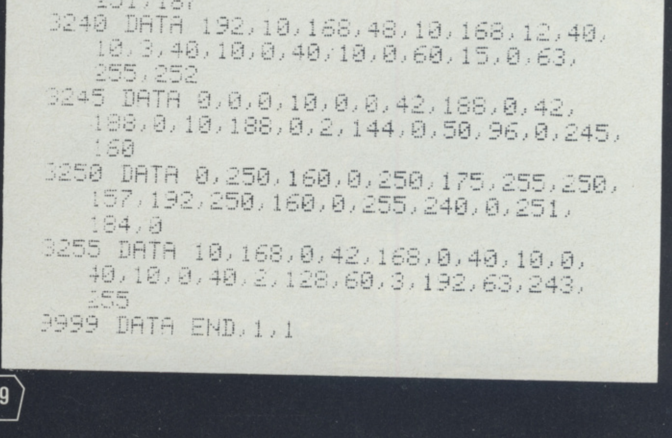


```
3125 DATA 68,161,15,65,164,7,85,85,95,
   66,168,7,85,165,83,65,244,7,21,165,
   90
3130 DATA 2,168,0,10,40,0,20,5,0,20,5,
   0,20,5,0,5,20,0,255,63,192
3230 DATA DIVER,2,80000
3231 DATA 0,0,0,10,0,0,42,188,0,42,
   188,0,10,188,0,2,144,0,50,96,0,245
3235 DATA 160,0,250,168,0,250,170,0,
   250,158,128,250,174,128,255,243,64,
   251,187
3240 DATA 192,10,168,48,10,168,12,40,
   10,3,40,10,0,40,10,0,60,15,0,63,
   255,252
3245 DATA 0,0,0,10,0,0,42,188,0,42,
   188,0,10,188,0,2,144,0,50,96,0,245,
   160
3250 DATA 0,250,160,0,250,175,255,250,
   157,192,250,160,0,255,240,0,251,
   184,0
3255 DATA 10,168,0,42,168,0,40,10,0,
   40,10,0,40,2,128,60,3,192,63,243,
   255
3999 DATA END,1,1
```

INDEX
COMMAND:
DISPLAY
FORMAT:A
END SEC: 128 64 32
STEP 1 2 4 8
WAVEFORM DISPLAY
*** PAGE 0 READY ***
VOICE
PATTERNS
MODE: 1

As regular graphics begin to reach their limit on existing microcomputers, creative hackers given to whistling in the bath are turning en masse to the growing potential of computerised music. And the technologies are coming together, too. 'Q' — BIG K's own mystery musician — brings us up to date with the new creative possibilities (and raps our knuckles when we don't learn our scales).

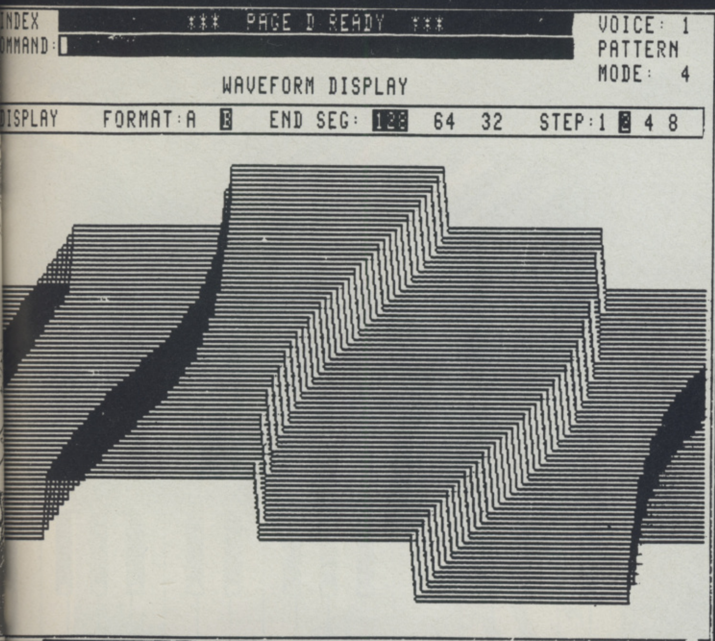
All together now . . .

Music, Maestro, Please

IF YOU'VE ever tried to make music with your micro you probably know that it's OK for squeaking 'Happy Birthday' but there's just no way it can be used for making 12 inch re-mixes. This is

3RestTieCode
ins
Part1 Bar Voice
BL
BAR
STATE
STEP

"Q" posing with Yamaha and "Nuevo Zorro" street goggles. Levis are optional.



```
NDEX          *** PAGE D READY ***          VOICE: 1
OMMAND:▯                                    PATTERN
                                            MODE:  4
                 WAVEFORM DISPLAY
DISPLAY   FORMAT:A  B   END SEG: 128   64   32   STEP:1 2 4 8
```

The Hills Are Alive . . . with the Shape of Music! Some of the screens from the Fairlight display.

because most micros only use sound to enhance games.

The good news is MIDI which stands for Musical Instrument Digital Interface, and what it means is that music making with your micro has jumped into hyperspace.

Within the next year new MIDI-compatible hardware is going to hit the streets, and in comparison with the cost of Fairlights and Synclaviers (more 'bout them later) at £25,000-£40,000 a throw, this hardware is going to be relatively cheap (prices start around £400). This means that you'll be able to create music on your micro by using MIDI interfaceable hardware and that you will be also be able to run your micro with the BIGGO systems and take advantage of all the latest hardware . . . drool, drool.

More good news is that some of this new hardware is already available. If you've got a Commodore 64 (hopefully adaptors will become available for Spectrums, Dragons etc) and it is MIDI interfaceable, you'll be able to use a number of MIDI compatible synths on the market.

The problem is that there does not seem to be a lot of software around at the moment so all you hackers out there had better start writing some! Another problem is that not all hardware manufacturers seem to actually know what's going on! Some people have started making MIDI interfaces for some popular synths so that you can hook them up to each other and to micros. The people to contact with regard to this are Syco Systems — see address at end of article. Hopefully some of you bright sparks will design a bit of hardware which Big K's readers could build cheaply while interfaces for popular micros are still thin on the ground).

SYNTH HARDWARE falls into various categories. The first (historically speaking) is the knob-twiddlers' analogue stuff which uses oscilators to create sounds, and modifies them with filters and such like. These synths are either Mono or Polyphonic (single or multiple 'voice'). Most of the older equipment is unable to store made up sounds in a memory, but most of the new synths (like the Prophet 5) enable you to make up sounds and store them and some even have cassette interface for large scale storage.

The makers of the Prophet 5 Sequential Circuits were one of the driving forces behind the original MIDI concept, and they have new models of MIDI controllable analogue synths. Analogue synths produce most of the 'Kraftwerky' types of sound and are relatively easy to operate, but also (with the exception of strings) tend to produce a 'synthy' sort of sound which seems artifical to a lot of people. Analogue synths (with their brethren the designated soundchip synths) are the first generation of mass appeal music machines.

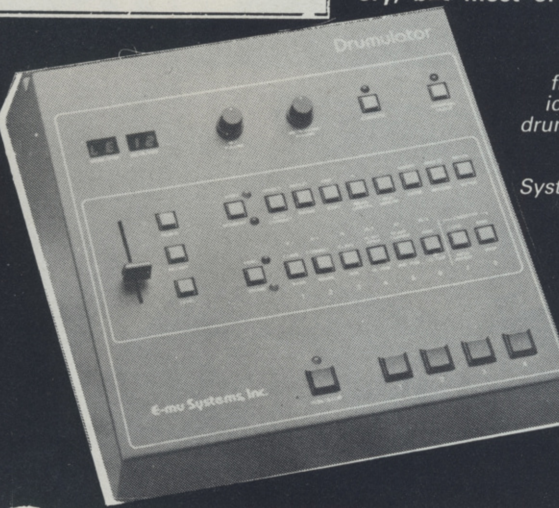
Built-in

Some of the newer popular synths have built in drum machines and most manufacturers produce drum machines for their own range of models, but there can be problems when trying to hook up the sequencer section of a synth to another manufacturer's drum machine (often the control voltages differ greatly). In this area the new MIDI compatible equipment will be much easier to use though problems are still being sorted out because the standard is so new. So always check equipment before buying.

The sort of equipment outlined — while not producing the most electrifying of sounds — will (when MIDI compatible) enable you and your micro to make some very respectable-sounding music.

The second category of synths are the digital synths and they tend to be very expensive at the moment. This is because of the big memory that is required to store and manipulate sounds digitally. Drum sounds are short, and so digital drum machine are relatively cheaper than music-making digital synths.

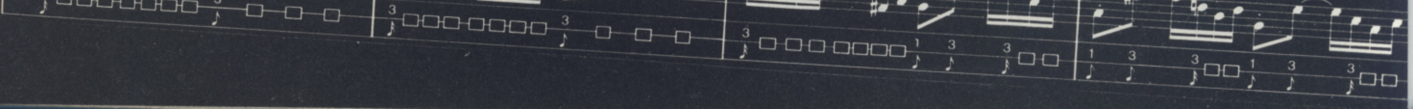
One of the first of this type of machine was the Linn Drum and most of the machines on the market seem to follow similar principles of design. The sounds are stored on EPROM and a micro processor enables you to program sequences. The



For the foot-tapping fraternity too idle to wave a drumstick — the Drumulator from E-Mu Systems. It's the descendant of those rhythm boxes of yore. But does it swing?

Roland
MSQ-700
DIGITAL KEYBOARD RECORDER
MODE
CLOCK
DISPLAY
METRONOME
TEMPO
TRACK
RESET
LOAD
BACK
FWD
STOP/CONTINUE PLAY
PLAY
REPEAT

The Roland MSQ-700 Digital Sequencer. More dials than a watchmaker, more buttons than a haberdasher. Making use of this particular widget, the aspiring Lloyd Webber types can make playing with oneself into an Art Form. And no, it won't make tea.



YAMAHA DX7
FAIRLIGHT
PITCH BEND MODULATION
LFO
VCO
VCF
VCA
EG
YAMAHA CS01II

The all-Australian Fab Fairlight, rather more up-market than your actual didgeridoo. It "samples" sounds than reproduces them digitally; after which, using special disc-based software, it "treats" them. Pricey, though.

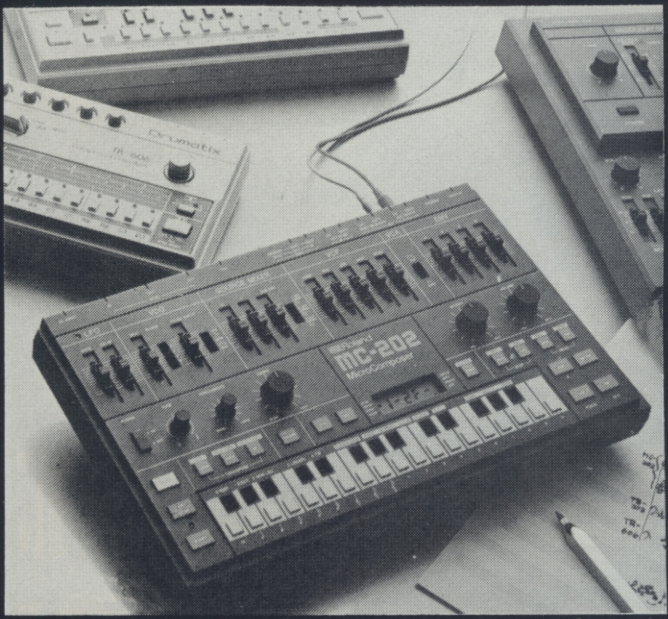
ABOVE: The Yamaha DX Series Programmable Algorithm Synth.

advantage of these machines over their cousins (analogue drum machines) is that the sound chips are digital recordings of *real* drums and since many new machines have great 'pitch control' some really amazing sounds can be created and programmed.

Programs may also be stored on cassette. Although many use various sync systems to enable them to be played with some types of synth not many are at present MIDI interfaceable, though this should change quite soon.

Digital

Other major types of digital synth are those that sample (i.e. record) and manipulate sounds digitally. One of the most popular is the Emulator . . . that's the one you tend to hear most of on *Top of the Pops.* Basically these synths digitally record (using microphone or direct input) any sound and transpose it to a keyboard in either mono or polyphonic mode. They also enable you to create your own library of sounds on floppy disc. Even more advanced are the PPG's, Synclaviers and Fairlights — instruments that enable you to digitally record sound and then to manipulate and combine sounds with the aid of special software. These synths also enable you to compose by storing sequences of notes and allow you to edit these sequences together.



These machines are the most advanced and thus the most expensive but since most will be MIDI compatible it will be possible to write a program for a piece of music on your micro — and *then* be able to interface your micro with these 'super' synths in a recording studio. These are the instruments that are now being used extensively to create the new, clean, heavily produced music that is in the pop charts. When used with the latest digital desks and tape recorders truly amazing sounds can be created. It is worth noting that very few records have real drummers anymore and that lots of really 'natural' horns, strings and even human voices are being produced by these new digital machines.

Another category of sound creation that is now available is called FM Synthesis. This system is being developed by Yamaha for their new range of synths, and while being more complex to use (because the parameters of sound creation are larger) produce very 'clean' sounds that are often very 'natural' sounding. They use ROM plug-in cartridges for sound storage. These new Yamaha synths are MIDI compatible but beware! Many players used to the advantages of instant sound modification of analogue synths find sound creation on these new synths a bit laborious; so try before you buy. As well as these keyboard synths Yamaha are bringing out a micro specifically aimed at music making which uses the same plug-in ROM as their keyboards.

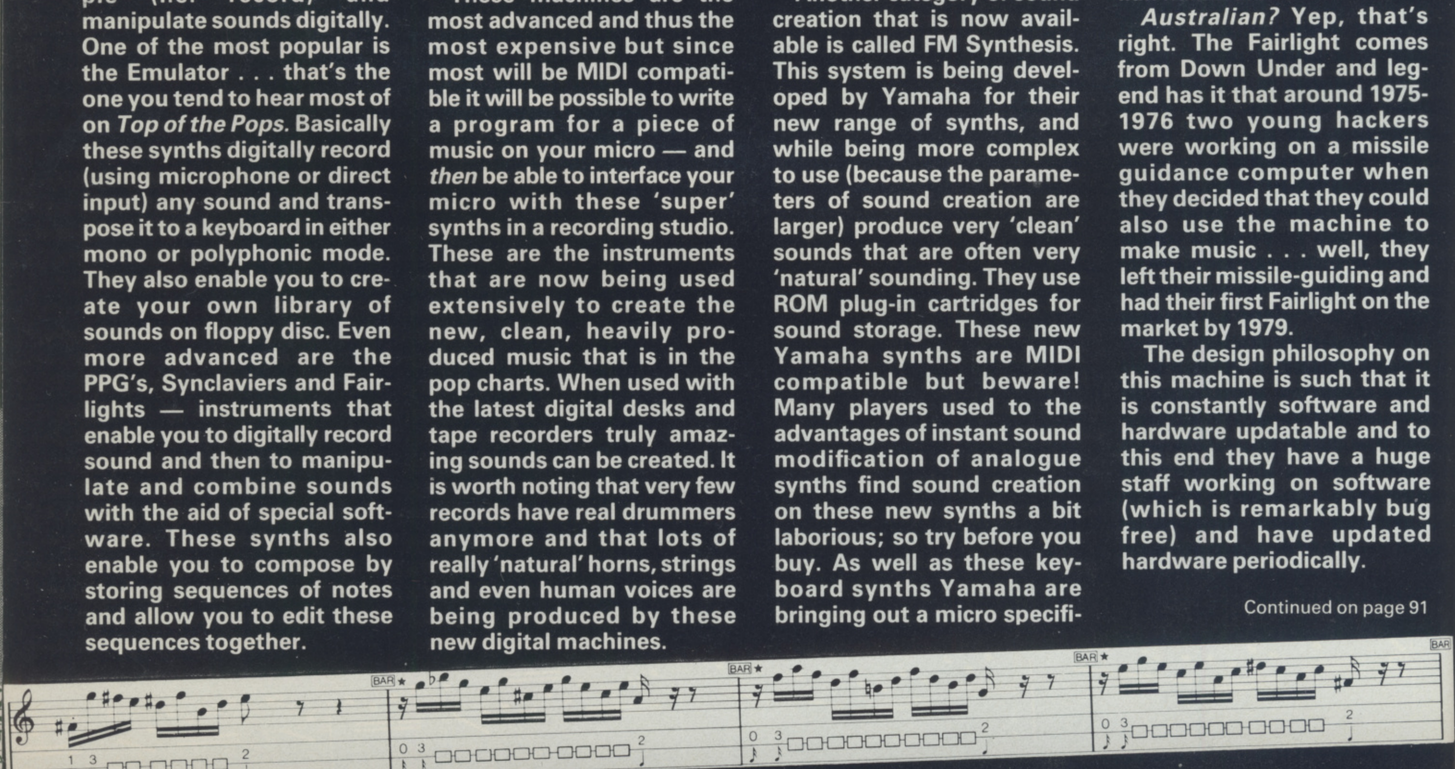
LEFT; The Roland MC-202 Sequencer. Using the MIDI compatible interface — a sort of musician's MSX Basic — all these gadgets and another slew yet to arrive will (hopefully) be linkable with even your average domestic micro. Then . . . eat your heart out, Andre Previn!

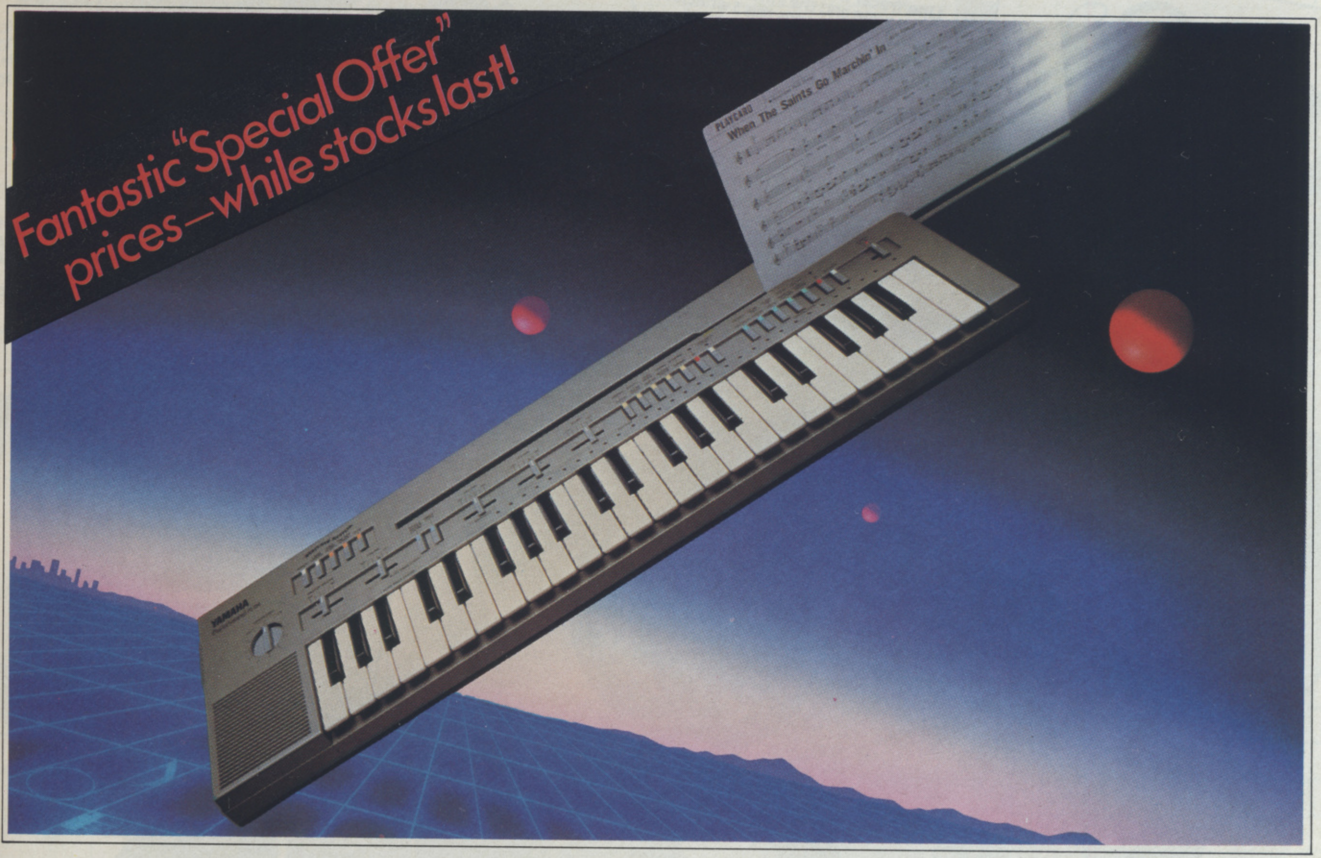
If you've been watching TV lately you will have noticed a thing called a Fairlight CMI (computer musical instrument). It's been featured in a number of music related programmes. This beasty is in a class all of its own (though some might argue otherwise!) so I thought we'd go into some more detail on this lovely (hands off!) expensive bit of Australian hardware.

Australian? Yep, that's right. The Fairlight comes from Down Under and legend has it that around 1975-1976 two young hackers were working on a missile guidance computer when they decided that they could also use the machine to make music . . . well, they left their missile-guiding and had their first Fairlight on the market by 1979.

The design philosophy on this machine is such that it is constantly software and hardware updatable and to this end they have a huge staff working on software (which is remarkably bug free) and have updated hardware periodically.

Continued on page 91

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- **Ten popular rhythms.**
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24hr Ansaphone: 0908-649222.

Playcard System

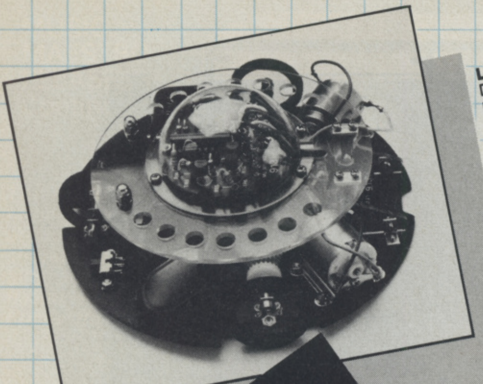
Name ____________________

Address ____________________

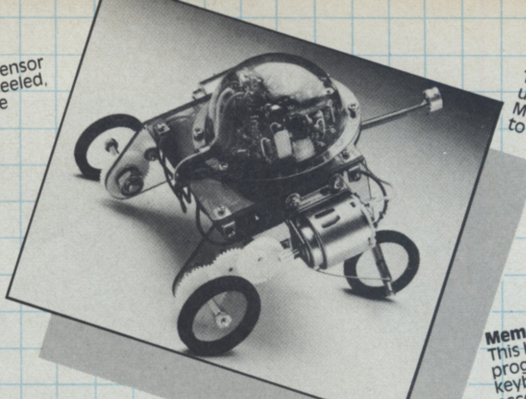
____

BK.7.84.

YAMAHA

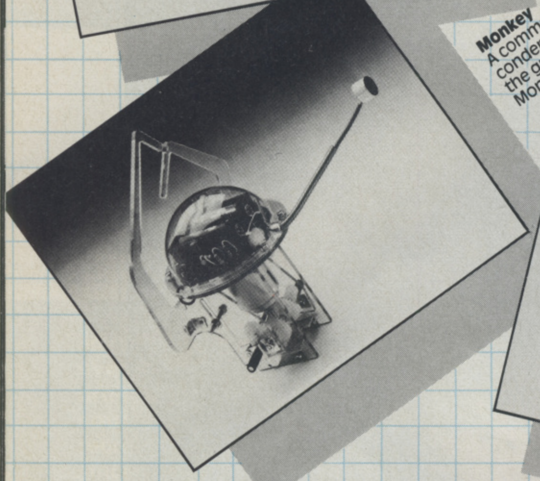


Line Tracer II £17.99
Draw a line and the infra-red sensor picks it up and sends this 3 wheeled, twin motored robot along the course you plot.

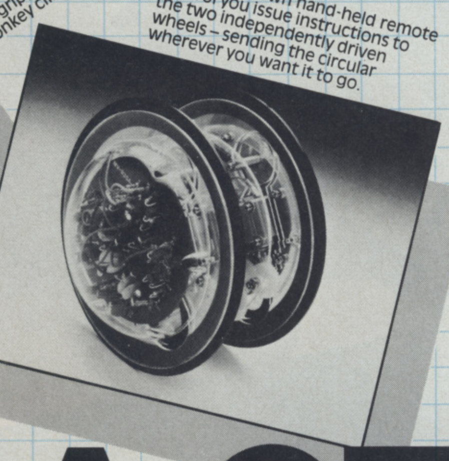


Piper Mouse £19.99
Supersonic sound sensor activa
The condenser microphone pic
up the sound to send the Piper
Mouse scurrying where you wan
to go.

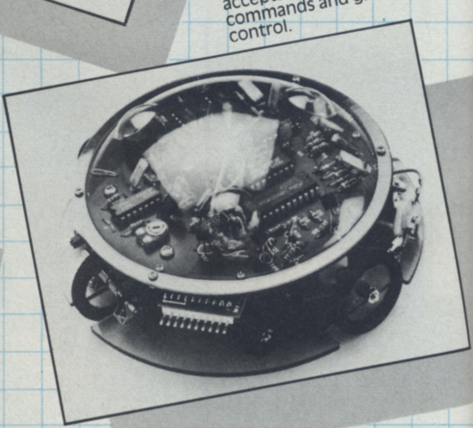
Monkey £9.99
A command from you into the condenser microphone activates the gripper arms and sends the Monkey climbing along its rope.



Circular £29.99
Through its own hand-held remote control you issue instructions to the two independently driven wheels – sending the circular wherever you want it to go.



Memocon Crawler £34.99
This highly intelligent Movit is
programmed through its own
keyboard. Its impressive memor
accepts a broad range of
commands and gives you comple
control.



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Name______________________ Address______________________

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☐ MEMOCON CRAWLER @ £34.99 ☐ MONKEY @ £9.99

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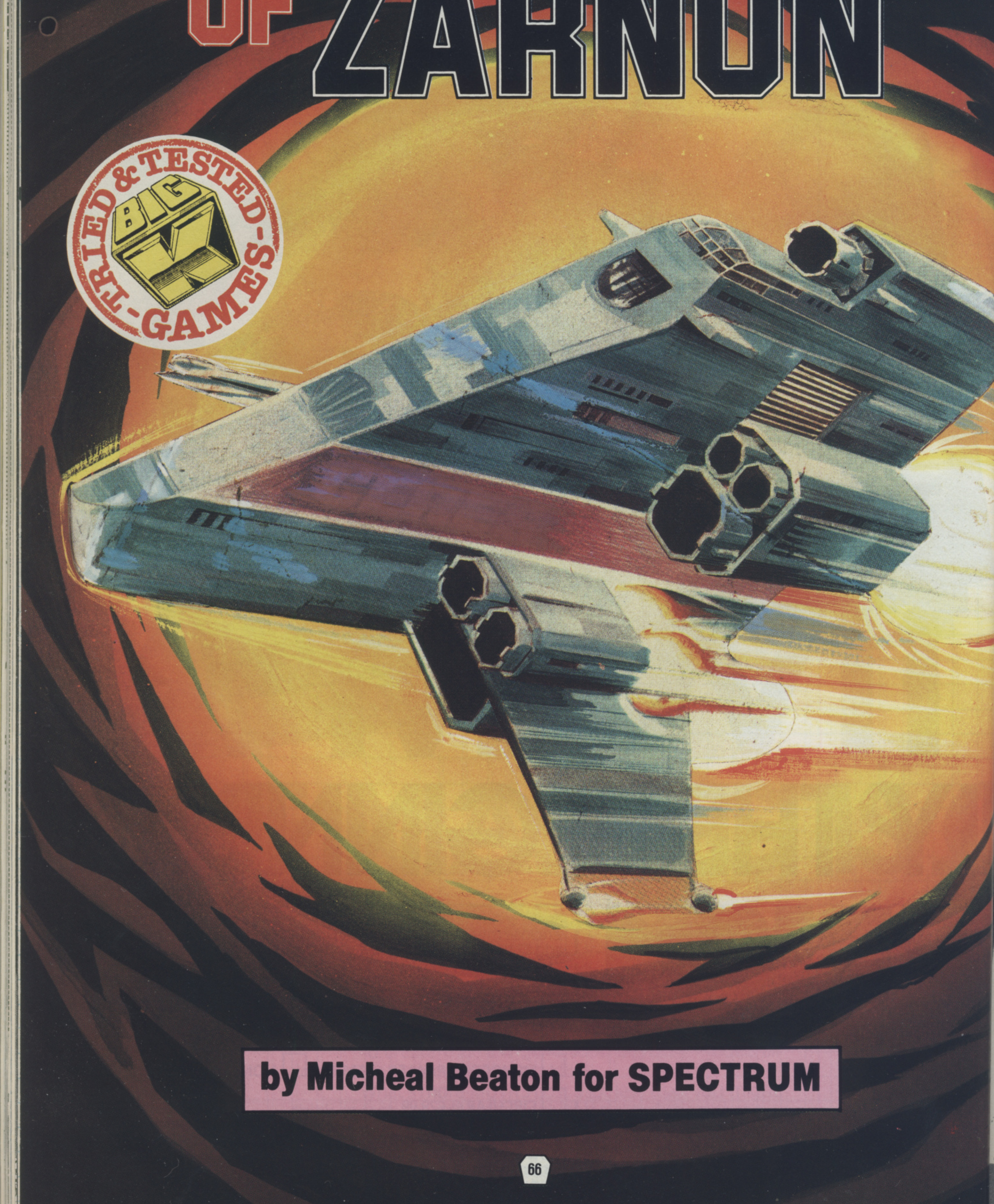
THE DEADLY TUNNELS OF ZARNON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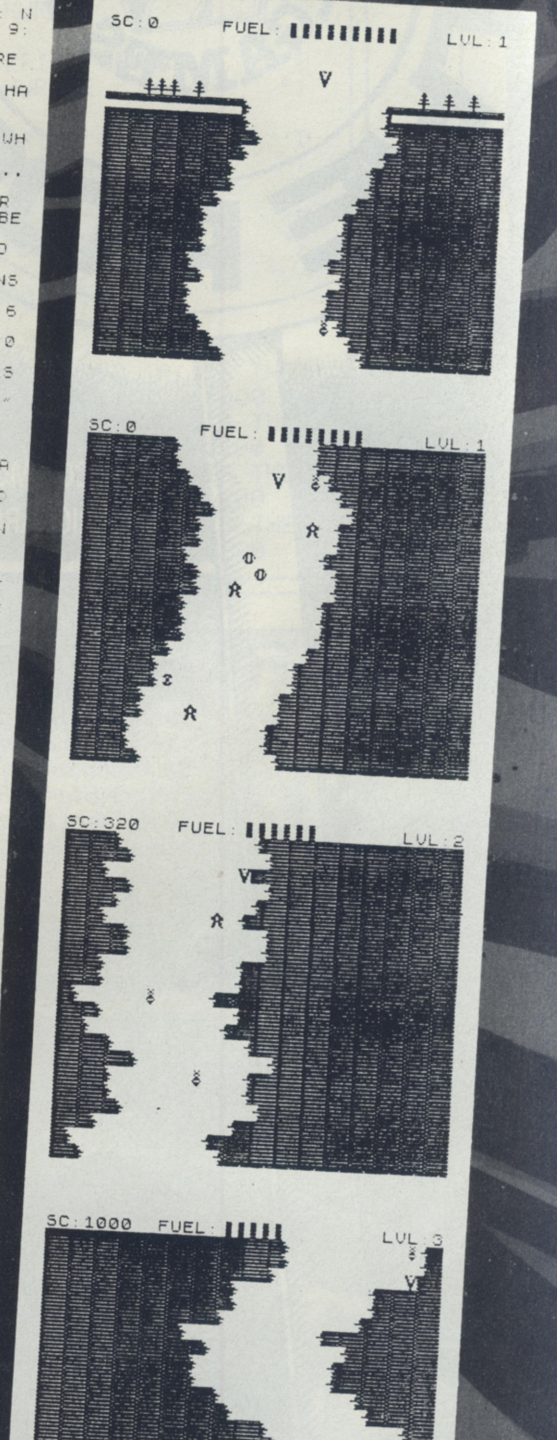
BIG K
GAMES

by Micheal Beaton for SPECTRUM

Seven tunnels lie between you and the centre of the planet Zarnon. Few have ventured into this deadly labyrinth before . . . none have returned. Fire up your CPU and take on the challenge . . . your Spectrum will love you for it.

CONTROLS
'Q': MOVE LEFT
'P': MOVE RIGHT
'CAPS-SHIFT' WITH THESE KEYS MAKES YOU MOVE FASTER IN THE DEEPER LEVELS
SCORE TABLE:
: FUEL DUMP
: SUPPLY CANISTER - 20pts
: POWER POD - 40pts
: ENERGISER - 60pts
PRESS 'S' TO START YOUR FLIGHT INTO THE TUNNELS . . .

```
   1 REM
   2 REM THE DEADLY
           TUNNELS
             OF ZARNON
   4 REM
   5 REM
   6 REM M.BEATON, 1982
   7 REM
   8 REM
  10 RANDOMIZE
  20 FOR i=1 TO 8: READ c$: FOR
 j=0 TO 7: READ c: POKE USR c$+j,
 c: NEXT j: NEXT i
  70 LET h=0
  80 LET s$="
  90 LET c$="R████████████████████
██████████L"
  95 LET f$="▌▌▌▌▌▌▌▌▌▌"
  96 GO TO 500
  99 PAPER 0: INK 0: BORDER 0: B
RIGHT 1: CLS : INK 6
 100 LET t=0
 101 LET t=t+RND*3: IF t>10 AND
t<23 THEN LET t=23: GO TO 101
 102 IF t>31 THEN GO TO 104
 103 PRINT AT 20,t; INK 4; BRIGH
T 0;"T": GO TO 101
 104 PRINT AT 21,0; BRIGHT 0; PA
PER 1;"██████████"; PAPER 0;"L"
; INK 0; BRIGHT 1;"          ";
INK 6; BRIGHT 0;"R"; PAPER 1;"██
████"
 105 LET s=0: LET t=12: LET l=1:
 LET z=0: LET f=10: LET p=17: LE
T m=1
 110 LET t=t+INT (RND*(l*2+1))-l
 120 IF t<2 THEN LET t=2
 130 IF t>20 THEN LET t=20
 150 POKE 23692,255: PRINT AT 3,
p;" ";AT 21,0' BRIGHT 0; INK l;c
$(33-t TO ); BRIGHT 1; INK 0;s$;
 BRIGHT 0; INK l;c$( TO 22-t)
 155 PRINT AT 0,0;"SC:";s;"
";AT 0,9;"FUEL:";f$( TO f);s$(f+
1 TO 10);"    LVL:";l
 156 LET n=INT (RND*20)+3
 157 IF n<7 THEN PRINT INK n;AT
21,t+INT (RND*10);CHR$ (141+n)
 160 IF ATTR (3,p)<64 THEN GO TO
 400
 170 LET p=p+(INKEY$="p")-(INKEY
$="q")+m*(INKEY$="P")-m*(INKEY$=
"Q")
 175 LET x=ATTR (3,p): IF x<64 T
HEN GO TO 400
 180 IF x=70 THEN LET f=f+(f<=9)
: BEEP .01,10: BEEP .01,15: BEEP
 .01,20: BEEP .01,15: GO TO 200
 190 IF x<>64 THEN LET s=s+20*(x
-66): BEEP .01,(x-64)*2
 200 PRINT INK 2;AT 3,p;"S"
 205 LET f=f-.07: IF f<.2 THEN G
O TO 400
 206 LET z=z+1: IF z=150 THEN GO
 TO 300
 207 READ n: BEEP .005,n: IF n=-
7 THEN RESTORE 9000
 210 GO TO 110
 300 BEEP .2,0: BEEP .2,5: BEEP
.2,7: BEEP .2,9: BEEP .2,7: BEEP
 .2,5: BEEP .2,7: BEEP .4,9: BEE
P .4,5: BEEP .4,5
 310 LET l=l+1: LET m=INT (l/2+.
5): LET z=0
 320 LET f=f+4+m: IF f>10 THEN L
ET f=10
 330 IF l=8 THEN GO TO 1500
 340 GO TO 110
 400 FOR i=1 TO 10: FOR j=0 TO 7
: PRINT AT 3,p; INK j;"S": BEEP
.005,j+i*2: NEXT j: NEXT i
 410 FOR j=28 TO 0 STEP -1: PRIN
T AT 3,p; INK INT (j/4);"S": BEE
P .005,j: NEXT j
 420 IF s<=h THEN PRINT AT 10,7;
"THE HI-SCORE IS ";h
 430 IF s>h THEN PRINT AT 10,5;"
YOU HAVE THE HI-SCORE": LET h=s
 440 FOR i=1 TO 500: NEXT i
 500 PAPER 1: INK 6: BORDER 1: F
LASH 0: BRIGHT 0: OVER 0: INVERS
E 0: CLS
 510 PRINT AT 0,0;"▄▄ ▄ ▄▄ ▄ ▄▄ ▄ ▄
▘ ▘"
 520 PRINT "  ▐HE DEADLY"
 530 PRINT "  "
 540 PRINT 'TAB 7;"▄ ▄ ▄▄ ▄ ▄▄ ▄ ▄
▘"
 550 PRINT TAB 7;"▐▐▐▐▐▐▙▐ ▙
"
 560 PRINT TAB 7;"▐▙▙▙▙▙▄▄▟
"
 570 PRINT 'TAB 14;"▄▄ ▄▄ ▄▄ ▄▄ ▄▄
▀▀"
 580 PRINT TAB 14;"▐▌▙ ▞▙▙▐▐▐
▐▐"
 590 PRINT TAB 14;"▙▌ ▙▐▐▙▐▐▐
▟▐"
 600 BEEP 1,-10: FOR i=1 TO 9: N
EXT i: BEEP 1,-13: FOR i=1 TO 9:
 NEXT i: BEEP 1,-18
 610 PRINT ''"  YOU, HUMAN, ARE
ABOUT TO GO TO"
 620 PRINT "A PLACE WHERE FEW HA
VE GONE"
 630 PRINT "BEFORE."
 640 PRINT '"  AND OF THE FEW WH
O HAVE GONE,"
 650 PRINT "NONE HAVE RETURNED..
."
 660 BEEP 1,-11: BEEP 1,-6: FOR
i=1 TO 5: NEXT i: BEEP 1,-10: BE
EP 1,-11
 670 PRINT '"  PRESS 'SPACE' TO
SEE THE"
 680 PRINT "              INSTRUCTIONS
."
 690 IF INKEY$<>" " THEN GO TO 6
90
 800 BRIGHT 1: BORDER 0: PAPER 0
: INK 3: CLS
 810 PRINT "  THE DEADLY TUNNELS
 OF ZARNON"
 820 PRINT "  """""""""""""""""""
""""""""""""""
 830 PRINT "  THE OBJECT OF THE
GAME IS TO"
 840 PRINT "STEER YOUR SPACE-CRA
FT THROUGH"
 845 PRINT "SEVEN TUNNELS TOWARD
S THE CENTRE"
 846 PRINT "OF THE PLANET ZARNON
..."
 850 PRINT INK 2'"  CONTROLS:"
 860 PRINT INK 6;"    'Q': MOVE L
EFT"
 870 PRINT INK 6;"    'P': MOVE R
IGHT"
 875 PRINT INK 6;"  'CAPS-SHIFT'
 WITH THESE KEYS  MAKES YOU MO
VE FASTER IN THE  DEEPER LEVEL
S"
 880 PRINT INK 2'"  SCORE TABLE:
"
 890 PRINT INK 6;"    D: FUEL DU
MP"
 900 PRINT INK 3;"    A: SUPPLY
CANISTER - 20pts"
 910 PRINT INK 4;"    B: POWER P
OD       - 40pts"
 920 PRINT INK 5;"    C: ENERGIS
ER       - 60pts"
 930 PRINT '"  PRESS 'S' TO STAR
T YOUR FLIGHT     INTO THE TUN
NELS..."
 940 IF INKEY$<>"s" THEN GO TO 9
40
 950 GO TO 99
1500 FOR i=1 TO 20: FOR j=0 TO 7
: BORDER j: BEEP .005,j*3+i: NEX
T j: NEXT i: BORDER 0
1510 PRINT AT 10,0; INK 6; PAPER
 2; FLASH 1;"       YOU HAVE SURV
IVED THE      DEADLY TUNNELS
OF ZARNON      "
1520 OVER 1: FOR i=1 TO 50: PRIN
T AT INT (RND*22),INT (RND*32);
PAPER INT (RND*8);" ": BEEP .005
,RND*80-20: NEXT i
1540 OVER 0: PRINT AT 14,0; PAPE
R 1; INK 6;"DO YOU WANT TO PLAY
AGAIN (Y/N)?"
1550 IF INKEY$="n" THEN BORDER 7
: PAPER 7: BRIGHT 0: INK 0: CLS
: STOP
1560 IF INKEY$<>"y" THEN GO TO 1
550
1570 IF s>h THEN LET h=s: GO TO
500
2000 DATA "l",128,224,192,240,25
2,224,248,224
3000 DATA "r",7,15,15,127,3,15,7
,15
4000 DATA "d",24,60,231,231,60,1
02,102,195
5000 DATA "s",219,195,102,102,60
,60,24,24
6000 DATA "a",0,60,102,24,24,102
,60,0
7000 DATA "b",0,60,102,165,165,1
02,60,0
8000 DATA "c",36,24,36,24,60,66,
60,24
8500 DATA "t",24,60,24,126,24,25
5,24,24
9000 DATA 2,0,-6,-7
9500 FOR i=0 TO 7: INPUT a: PRIN
T a: NEXT i
```



PEEKED AT THE POST

TRIED & TESTED GAMES

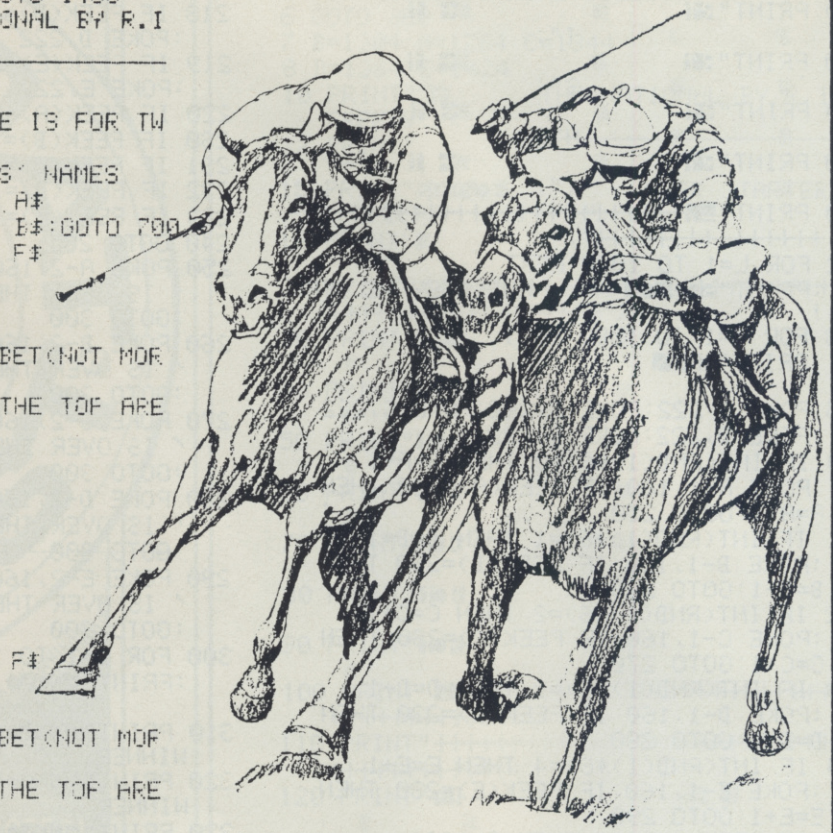
for COMMODORE 64
by RICHARD PREEDY

```
1 PRINT"▒":P=1000:O=1000
5 POKE 53281,0:POKE 53280,8
6 GOTO 360
7 B=1304:A=1264:C=1344
8 D=1384:E=1424
10 PRINT"▒█          THE NATIONAL BY R.I.
   PREEDY
12 PRINT"              ________________________
   _____
15 PRINT"▒▒▒█▒            UNDER STARTERS
   ⁄ ORDERS              ";
16 PRINT"█|
                     ";
20 PRINT"▒▒▒▒▒█|++++++++++++++++++++++++++
   +++++++++++++++++++++";
30 PRINT"██            ▒
   ▒          ▒▒ ";
40 PRINT"██▒            ▒
   ▒          ▒▒ ";
50 PRINT"██▒            ▒
   ▒          ▒▒ ";
60 PRINT"██▒            ▒
   ▒          ▒▒ ";
70 PRINT"██▒            ▒
   ▒          ▒▒ ";
80 PRINT"██▒            ▒
   ▒          ▒▒ ";
90 PRINT"██▒            ▒
   ▒          ▒▒ ";
100 PRINT"██+++++++++++++++++++++++++++++
   ++++++++++++++++"
110 PRINT"++++++++++++++++++++++++++++++++
   ++++++++++++++";
120 PRINT"▒█      ▒          ▒█ █
   ▒      ▒      |";
130 PRINT"▒█      ▒          ▒█ █
   ▒      ▒      F";
140 PRINT"▒█      ▒          ▒█ █
   ▒      ▒      I";
```

And at the last fence it's 2-Player Game from Choose a Horse out of a List of 5. Place a Bet is coming up strongly on the outside of Up To £1000 Per Game. Also making a good showing is After Players' Selection only a nose in front of Race Starts. Random Movement fell at the start of this seven-jump course.

```
150 PRINT"▓▓       ▒          ▒▓ ▓
   ▒     ▒       N";
160 PRINT"▓▓       ▒          ▒▓ ▓
   ▒     ▒       I";
170 PRINT"▓▓       ▒          ▒▓ ▓
   ▒     ▒       S";
180 PRINT"▓▓       ▒          ▒▓ ▓
   ▒     ▒       H";
190 PRINT"▓▓       ▒          ▒▓ ▓
   ▒     ▒       |";
200 PRINT"▓▓++++++++++++++++++++++++++
  ++++++++++++++++";
202 FOR L=1 TO 1000:NEXT
   :PRINT"▓▓▓▓▓         AND THEY'RE OFF
   !                 ";
203 FOR L=1 TO 1000:NEXT
   :PRINT"▓▓▓▓
                    ";
205 POKE A,222:POKE B,222:POKE C,222
   :POKE D,222:POKE E,222
210 IF INT(RND(1)*6)=0 THEN A=A+1
   :POKE A-1,160:IF PEEK(A)=230 THEN
   A=A+1:GOTO 250
211 IF INT(RND(1)*6)=1 THEN B=B+1
   :POKE B-1,160:IF PEEK(B)=230 THEN
   B=B+1:GOTO 260
212 IF INT(RND(1)*6)=2 THEN C=C+1
   :POKE C-1,160:IF PEEK(C)=230 THEN
   C=C+1:GOTO 270
213 IF INT(RND(1)*6)=3 THEN D=D+1
   :POKE D-1,160:IF PEEK(D)=230 THEN
   D=D+1:GOTO 280
214 IF INT(RND(1)*6)=4 THEN E=E+1
   :POKE E-1,160:IF PEEK(E)=230 THEN
   E=E+1:GOTO 290
215 IF PEEK(A)=220 THEN A=1664
   :POKE A,222
216 IF PEEK(B)=220 THEN B=1704
   :POKE B,222
217 IF PEEK(C)=220 THEN C=1744
   :POKE C,222
218 IF PEEK(D)=220 THEN D=1784
   :POKE D,222
219 IF PEEK(E)=220 THEN E=1824
   :POKE E,222
220 IF PEEK(A)=134 THEN 310
230 IF PEEK(B)=137 THEN 320
231 IF PEEK(C)=142 THEN 330
232 IF PEEK(D)=137 THEN 340
233 IF PEEK(E)=147 THEN 350
240 GOTO 205
250 POKE A-2,160:PRINT"▓▓▓▓▓          'A
   ' IS OVER THE HURDLE            ";
   :GOTO 300
260 POKE B-2,160:PRINT"▓▓▓▓▓          'B
   ' IS OVER THE HURDLE            ";
   :GOTO 300
270 POKE C-2,160:PRINT"▓▓▓▓▓          'C
   ' IS OVER THE HURDLE            ";
   :GOTO 300
280 POKE D-2,160:PRINT"▓▓▓▓▓          'D
   ' IS OVER THE HURDLE            ";
   ~~GOTO 300~~
290 POKE E-2,160:PRINT"▓▓▓▓▓          'E
   ' IS OVER THE HURDLE            ";
   :GOTO 300
300 FOR L=1 TO 1000:NEXT
   :PRINT"▓▓▓▓
                    ";:GOTO 215
310 PRINT"▓▓▓▓▓          AND 'A' IS THE
   WINNER           ";:GOTO 1000
320 PRINT"▓▓▓▓▓          AND 'B' IS THE
   WINNER           ";:GOTO 1100
330 PRINT"▓▓▓▓▓          AND 'C' IS THE
   WINNER           ";:GOTO 1200
340 PRINT"▓▓▓▓▓          AND 'D' IS THE
   WINNER           ";:GOTO 1300
```

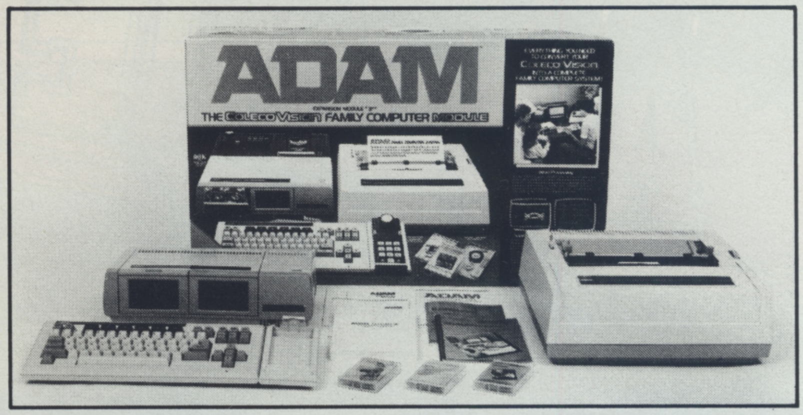
```
350 PRINT"▒▒▒▒▒          AND ´E´ IS THE
   WINNER                  ";:GOTO 1400
360 PRINT"▒          THE NATIONAL BY R.I
   .FREEDY          ______________________
370 PRINT"
   ________

380 PRINT"           THIS GAME IS FOR TW
   O PEOPLE!
410 PRINT"ENTER THE FLAYERS´ NAMES
415 PRINT"PLAYER.1.":INFUT A$
420 PRINT"PLAYER.2.":INFUT B$:GOTO 700
560 PRINT"ON HORSE";:INFUT F$
670 FRINT"AMOUNT";:INFUT F
680 IF F>1000 THEN 670
590 GOTO 7
700 PRINT""A$" PLACE YOUR BET(NOT MOR
   E THAN \"0")
710 PRINT"THE HORSES FROM THE TOF ARE
   :-A
720 PRINT"
    B
730 PRINT"
    C
740 PRINT"
    D
750 PRINT"
    E
760 PRINT"ON HORSE";:INPUT F$
770 PRINT"AMOUNT";:INPUT F
780 IF F>1000 THEN 770
790 PRINT""B$" PLACE YOUR BET(NOT MOF
   E THAN \1000)
800 PRINT"THE HORSES FROM THE TOF ARE
   :-A
810 PRINT"
    B
820 PRINT"
    C
830 PRINT"
    D
840 PRINT"
    E
850 PRINT"ON HORSE";:INFUT G$
860 PRINT"AMOUNT";:INFUT G
870 IF G>1000 THEN 860
880 GOTO 7
1000 FOR L=1 TO 3000:NEXT
   :FRINT"▒▒          THE NATIONAL BY R.I
   .FREEDY          ______________________
1010 FRINT"
   ________

1020 IF F$="A"THEN FRINT""A$"WINS \"F
   *2"
1030 IF F$<>"A"THEN PRINT""A$"LOSES \
   "F"
1040 IF G$="A"THEN FRINT""B$"WINS \"G
   *2"":GOTO 1460
1050 IF G$<>"A"THEN FRINT""B$"LOSES \
   "G"":GOTO 1460
1100 FOR L=1 TO 3000:NEXT
   :FRINT"▒▒          THE NATIONAL BY R.I
   .FREEDY          ______________________
1110 FRINT"
   ________

1120 IF F$="B"THEN FRINT""A$"WINS \"F
   *2"
1130 IF F$<>"B"THEN FRINT""A$"LOSES \
   "F"
1140 IF G$="B"THEN FRINT""B$"WINS \"G
   *2"":GOTO 1460
1150 IF G$<>"B"THEN FRINT""B$"LOSES \
   "G"":GOTO 1460
1200 FOR L=1 TO 3000:NEXT
   :FRINT"▒▒     THE NATIONAL BY R.I.F.
   REEDY
```



```
1210 FRINT"
   ________

1220 IF F$="C"THEN FRINT""A$"WINS \"F
   *2"
1230 IF F$<>"C"THEN FRINT""A$"LOSES \
   "F"
1240 IF G$="C"THEN PRINT""B$"WINS \"G
   *2"":GOTO 1460
1250 IF G$<>"C"THEN FRINT""B$"LOSES \
   "G"":GOTO 1460
1300 FOR L=1 TO 3000:NEXT
   :FRINT"▒▒          THE NATIONAL BY R.I
   .FREEDY          ______________________
1310 FRINT"
   ________

1320 IF F$="D"THEN FRINT""A$"WINS \"F
   *2"
1330 IF F$<>"D"THEN FRINT""A$"LOSES \
   "F"
1340 IF G$="D"THEN FRINT""B$"WINS \"G
   *2"":GOTO 1460
1350 IF G$<>"D"THEN FRINT""B$"LOSES \
   "G"":GOTO 1460
1400 FOR L=1 TO 3000:NEXT
   :FRINT"▒▒          THE NATIONAL BY R.I
   .PREEDY          ______________________
1410 PRINT"
   ________

1420 IF F$="E"THEN FRINT""A$"WINS \"F
   *2"
1430 IF F$<>"E"THEN FRINT""A$"LOSES \
   "F"
1440 IF G$="E"THEN FRINT""B$"WINS \"G
   *2"":GOTO 1460
1450 IF G$<>"E"THEN FRINT""B$"LOSES \
   "G"":GOTO 1460
1460 FRINT"▒▒▒▒▒▒▒▒▒▒▒ANOTHER GO (Y/
   N)?"
1465 GET A$:IF A$=""THEN 1460
1470 IF A$="N"THEN END
1480 IF A$="Y"THEN 360
```

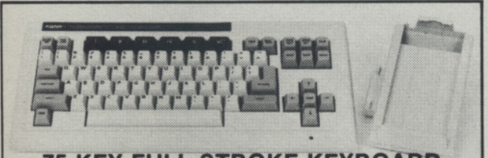
A COMPLETE PACKAGE - ALL THIS FOR £499!

- * 80K* RAM (Exp to 144K)
- * Full Stroke Keyboard
- * 256K Data Storage Unit
- * Daisywheel Printer
- * Built-in Word Processing
- * Buck Rogers Arcade Game
- * Colecovision Compatible



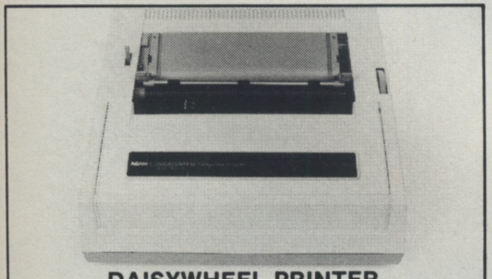
ADAM™ - £499

Inc VAT

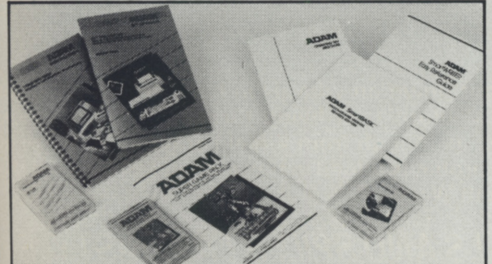


75 KEY FULL STROKE KEYBOARD

MEMORY CONSOLE & DATA DRIVE



DAISYWHEEL PRINTER



COMPREHENSIVE INSTRUCTIONS

COLECOVISION GAMES CONSOLE

QUITE SIMPLY - VALUE FOR MONEY!

If you're looking for real value in a computer system, one which can handle anything from serious Word Processing to enhanced Colecovision style video games such as Buck Rogers, look no further. The Coleco Adam is here with a package which will make you wonder if you're dreaming when we tell you about it. A price breakthrough in computer systems, Adam is comprised of an 80K RAM memory console with a built-in 256K digital data drive; a professional quality, stepped and sculptured 75 key full-stroke keyboard; a letter quality daisywheel printer and a full word processing program built into the Console. Two additional pieces of software, Smart BASIC and also 'Buck Rogers - Planet of Zoom' (the ultimate in advanced video games), are included as well as a blank digital data pack. Adam can be used with any domestic colour Television set.*

MEMORY CONSOLE/DATA DRIVE: *The heart of the Adam system is the 40K ROM and 64K RAM memory console which combines with the 32K ROM and 16K RAM in Colecovision to give you a total of 72K ROM (including 24K cartridge ROM) and 80K RAM (expandable to 144K). Built into the memory console is a digital data drive which accepts Adam's digital data packs, a fast and reliable mass storage medium that is capable of storing 256K of information, that's about 250 pages of double spaced text! The console is also designed to accomodate a second optional digital data drive.

FULL STROKE KEYBOARD: The Adam keyboard has been designed as a professional quality keyboard that combines ease of use with an impressive array of features. It is stepped and sculptured for maximum efficiency and has 75 full stroke keys which include 6 colour coded Smart Keys which are redefined for each new application; 10 command keys which are dedicated to the word processing function, and 5 cursor control keys for easy positioning of the cursor at any point on the screen. You can attach a Colecovision controller to the keyboard to function as a numeric keypad for easy data entry. It can also be held like a calculator, a feature which makes working with numbers particularly easy. The joystick part of the hand controller can be used in the same way as the cursor control keys, to move the cursor around the screen.

LETTER QUALITY PRINTER: The SmartWriter letter quality daisywheel printer is a bi-directional 80 column printer which prints at a rate of 120 words per minute. It uses standard interchangeable daisywheels, so a variety of typestyles are available. The printer has a 9.5 inch wide carriage for either single sheets or continuous fan fold paper and uses standard carbon ribbons. It is comparable to many printers which cost as much as the total Adam package. The printer can be used either with the Adam's SmartWriter word processing program or as a stand alone electronic typewriter.

BUILT-IN WORD PROCESSOR: Adam comes with SmartWriter word processing built-in. This program is so easy to use that you only have to turn the power on and the word processor is on line and ready to go. Detailed instruction books are not necessary as the Computer guides you step by step, working from a series of Menu commands. It enables you to type in text, then completely edit or revise it with the touch of a few keys. Changes are readily made and a series of queries from the computer confirm your intentions, so that you can continuously double check your work as you type.

COMPATIBILITY WITH COLECOVISION: By using high speed interactive microprocessors in each of the modules, the Coleco Adam is designed to take additional advantage of both the 32K ROM and 16K RAM memory capability in the Colecovision. If you do not already own a Colecovision Console (£99 inc VAT), then you will need to purchase this when you initially purchase your Adam Computer package (£499 inc VAT), making a total purchase price of (£598 inc VAT).

WHAT IS COLECOVISION: Colecovision is one of the worlds most powerful video game systems, capable of displaying arcade quality colour graphics of incredible quality on a standard Colour TV set. The console (see picture bottom left) accepts 24K ROM cartridges such as Turbo and Zaxxon and is supplied with the popular Donkey Kong cartridge and a pair of joystick controllers. Colecovision has a range of licenced arcade hits available such as: Gorf, Carnival, Cosmic Avenger, Mouse Trap, Ladybug, Venture, Smurf, Pepper II, Space Panic, Looping, Space Fury, Mr Do, Time Pilot, Wizard of Wor and many others. So there you have it, Adam plus Colecovision the unbeatable combination. Send the coupon below for your FREE copy of our 12 page Colour brochure giving details on the complete Adam system.

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☐ I own a .... Videogame ☐ I own a .... Computer

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Address: ....

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Postcode: ....

ORDER REQUEST:

Please send me: ☐ Adam (add-on package only) .... £499 inc VAT
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Rev 2

ARCADE ALLEY

PAUL RAMBALI dons bone-dome and G-suit for some breathtaking air combat sequences

FOXBATS WERE NEVER LIKE THIS...

M.A.C.H. 3
LASER GAME
M

FROM THE moment you drop the coins in the slot and literally feel the jet engines rumble to life, you know you are in for a *ride*.

Mylstar Electronics' *M.A.C.H. 3* is the most sophisticated, the most hopelessly gripping laser game yet — one that uses real-life footage to put you in the cockpit of a modern jet fighter. Ever wanted to fly a crack Israeli Air Force raid across the Golan Heights? Ever wondered what a victory roll feels like at 2,000 feet? All you have to do is scramble and go upstairs in this baby.

The hardware alone is impressive. Designed by Dave Pfiefer, the wrapover console and the special panoramic screen image interacts with the aural (and — I promise you — *physical*) sound effects to create a startling and highly effective fantasy. The engines throb beneath you, missiles impact with a distant thud, and as the jet banks and rolls, you find yourself leaning helplessly into the turns.

Select a game option to start: either over-flying — i.e. looking straight down on what is in fact actual footage of San Diego in California; or flying through — with a view straight ahead as though from a real cockpit — a series of linked scenes probably filmed in the arid, rocky terrain of the American South West.

THRILLS AND SPILLS LASER-STYLE

In both options, your unmarked Military Air Command Hunter jet is superimposed using computer graphics, but the first — over-flying — definitely lacks the excitement of the latter. It's much slower and, despite targets on the roads, quayside and industrial sites below, your attention is drawn to the mundane business of dodging enemy jets and rockets that scroll across the screen in the all-too-familiar patterns of games like *River Raid*.

Everyone but the *M.A.C.H. 3* neophyte will opt straightaway for the second game. Targets appear marked by com-

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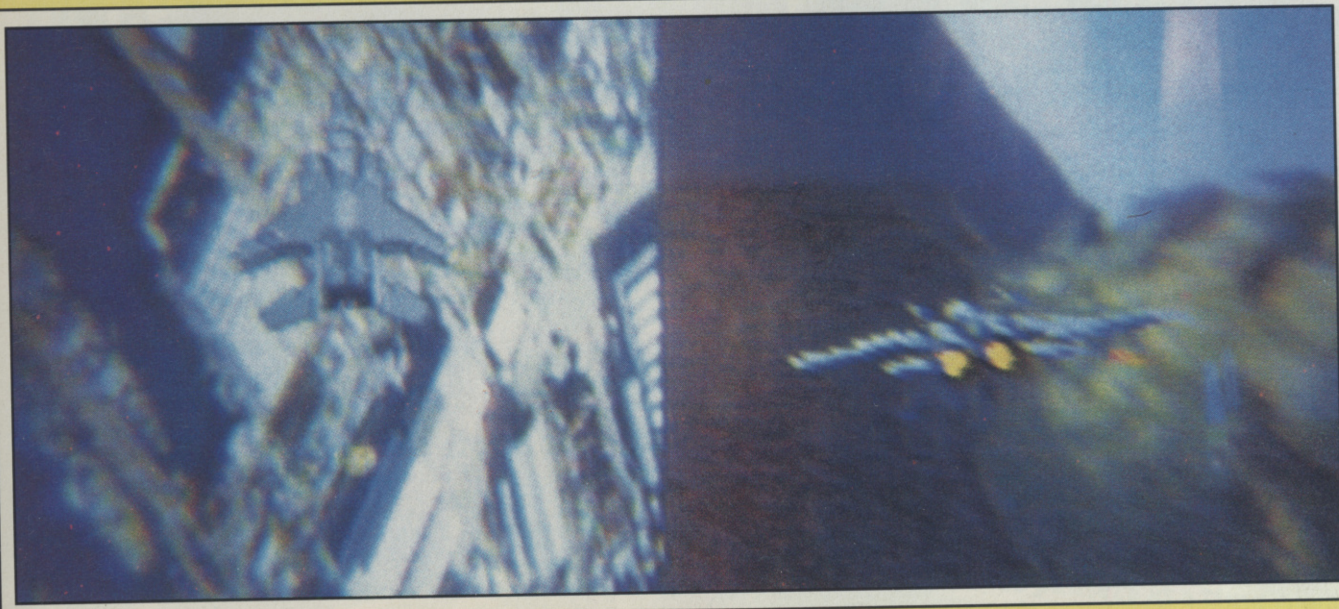
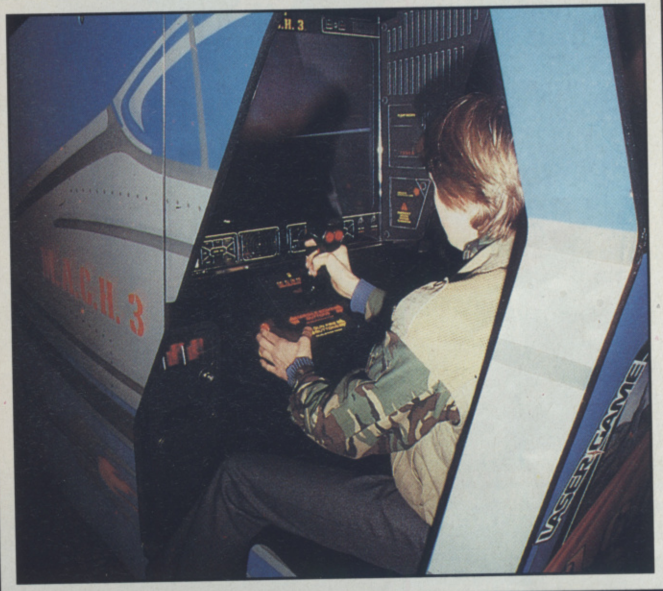


20p GAME
2×10p
M.A.C



puter-generated 'windows' into which you must fire missiles as you hurtle across the landscape, coming in low over rocky outcrops and banking hard into valleys to outflank enemy rockets. A steep climb takes you high into clouds that hide helicopter gunships; diving down again, your target is a hydro-electric dam. A hair-raising turn takes you over some hills and into a heavily-fortified ravine. Here the enemy gunners have heat-seeking rockets on their side, and many lives have been spent mastering the knack of hitting these exasperating projectiles before they intercept. The interminable, perilous (and costly) ravine finally opens out onto flatlands, with no target in sight and time for a well-earned victory roll.

Programmed by Chris Brewer and Fred Darmstadt, *M.A.C.H. 3* is a real *roller-coaster* — a loud, dizzy, high-speed, vertigo-inducing tumult of sights and sounds. Simply hanging on to the joystick and plummeting through the air is a thrill, never mind scoring any points. The daredevil manoeuvres executed in the course of this 3D spectacle are a challenge for the strongest stomachs. So captivating is it that one reviewer even wrote that she heard verbal instructions advising which targets hit (or was I so caught up that I didn't?).

ALONG COMES EASTWOOD

Like Taito's *Laser Grand Prix* — a *Pole Position* game superimposed on actual footage of the Mount Fuji race circuit — *M.A.C.H. 3*'s real backgrounds are an eye-popping advance on Don Bluth's cartoon animation for *Dragon's Lair*. By the time you read this it will have been joined by Atari's *Firefox*, incorporating footage from the Clint Eastwood film about stealing a Soviet jet. And it can only be a matter of time before you are sitting alongside Knightrider or even playing tennis with John McEnroe. Imagine the sound effects on that!

SOFTWARE INVASION...

Let excitement invade your home computer! Travel to Alpha Centauri. Enter the Vortex. Command the ground missiles, or join the shoot-out at the O.K. Corral!

3D BOMB ALLEY

GUNSMOKE

...the movement of the saloon-bar door was all the warning he needed! At the speed of light his hand moved toward his holster, while a sixth sense warned him of the upper floor window... 3D ACTION, SOUND EFFECTS, BEAUTIFUL GRAPHICS BBC MODEL B £7.95 CASSETTE £11.95 DISK

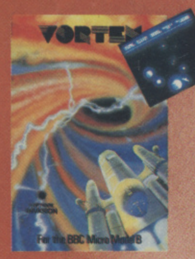
3D BOMB ALLEY

... the continued thunder of the hissing ground missiles had long now deafened him - unless he had some of those bombers down, the fleet, in the small stretch of water was a sitting duck... 3D ACTION, SOUND EFFECTS, BEAUTIFUL GRAPHICS BBC MODEL B £7.95 CASSETTE £11.95 DISK

ATTACK ON ALPHA CENTAURI
For the BBC Acorn Model B

ATTACK ON ALPHA CENTAURI

... he punched the key, and the control monitor filled with the picture of bug-eyed wasps attacking from their volcanic nest; decisively he dived to the left and his laser gun burst into action... 3D ACTION, EXPLOSIVE SOUND EFFECTS BBC MODEL B £7.95 CASSETTE £11.95 DISK


VORTEX
For the BBC Micro Model B

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SOFTWARE INVASION
For the BBC Micro Model B

NEW!

Spooks & Spiders
SOFTWARE INVASION
For the BBC Micro Model B

NEW!

VORTEX

... there was no escape, he had to enter the Vortex and bet on his skills! He grabbed the manual controls and with determination fired both upper deck guns... EXCELLENT SOUND KEYBOARD OR JOYSTICK, BBC MODEL B ALSO AVAILABLE ON ACORN ELECTRON CASSETTE FOR £7.95.

EAGLES WING

. . . he glanced at his fuel levels, a few more seconds of flying time. He had to swing round through the burst of fire to reach the Docking platform, he knew, in two minutes the game could be over . . . GRAPHICS, REALISTIC COMBAT, SUPERB CONDITIONS, BBC MODEL B, £7.95 CASSETTE, £11.95 DISK.

Spooks & Spiders

. . . perhaps, very slowly, he could reach the cellar – quietly he started climbing down, his foot slipped as the giant spider dived towards him . . . SOUND EFFECTS, EXCELLENT GRAPHICS, BBC MODEL B, £7.95 CASSETTE, £11.95 DISK.

HOW TO ORDER: You may purchase any of the Games listed from most good BBC Software Stockists W H Smiths, HMV or your nearest Spectrum Dealer. To order direct, fill in the coupon below with your requirements, make cheque/P.O. payable to: SOFTWARE INVASION and post to us. Please allow 7 to 14 days for delivery.

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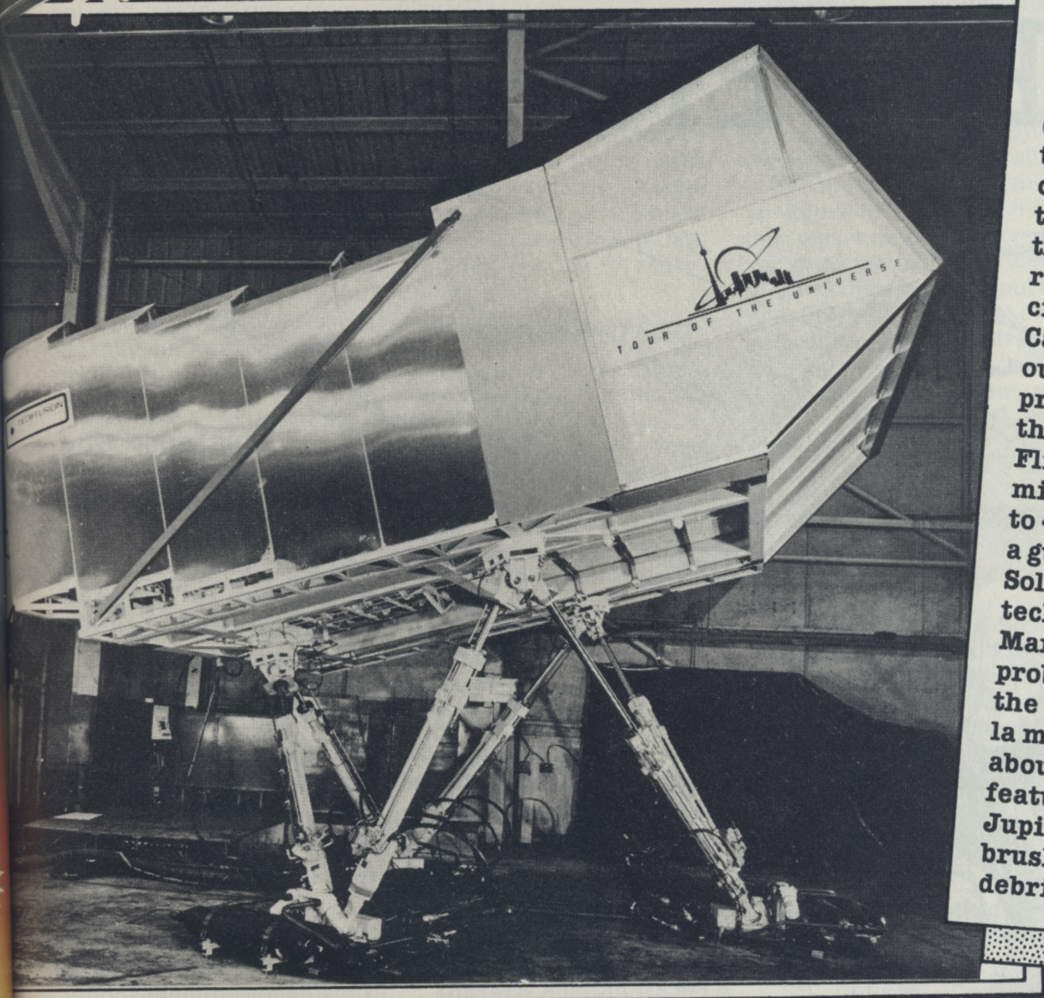
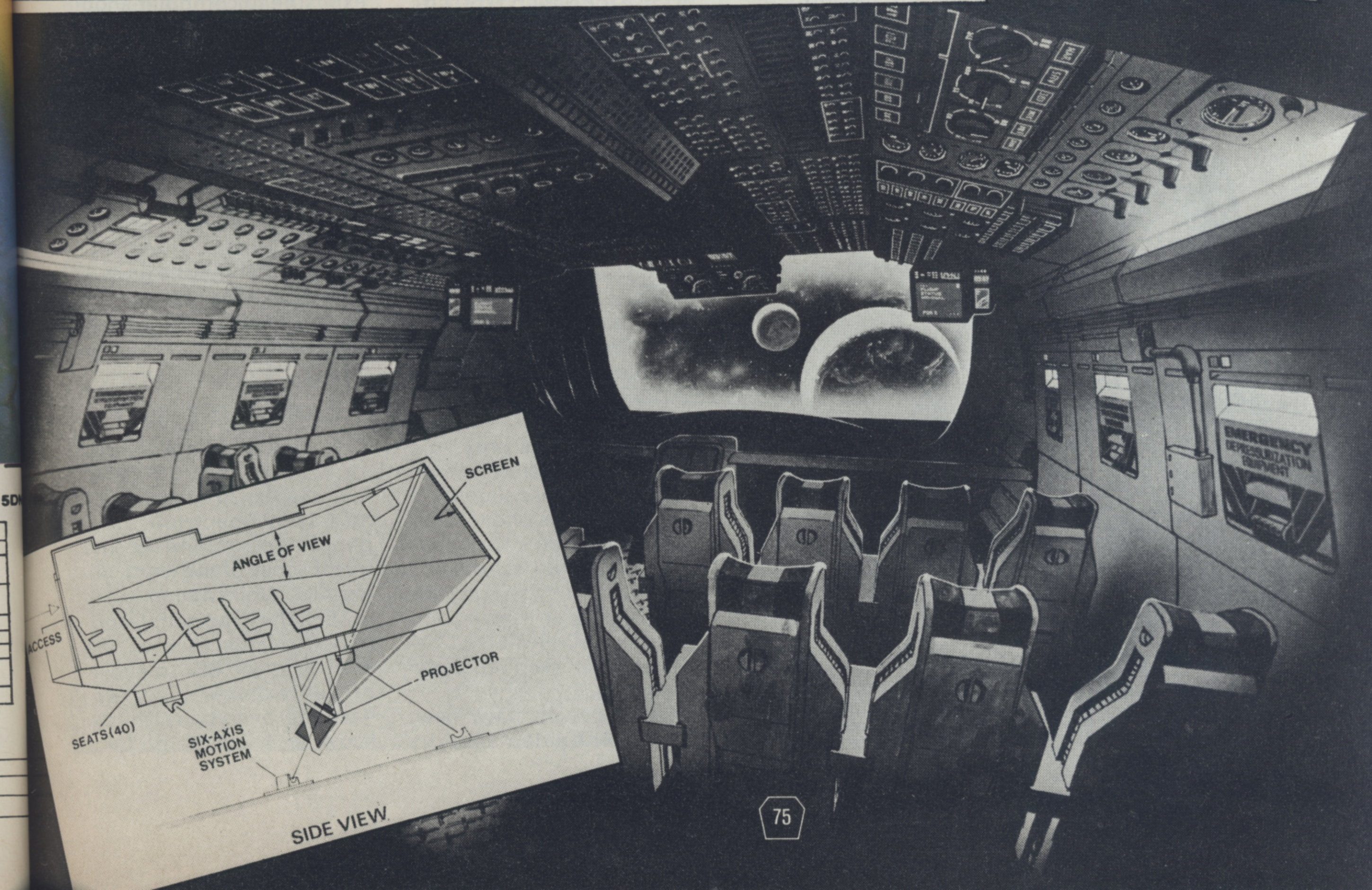

TOUR OF THE UNIVERSE
REDIFFUSION

ROLL OVER NINTENDO! After the success of their 747 Flight Simulator (reviewed in BIG K No. 1), the mighty Rediffusion company have turned their hand to lighter things. By the time you read this, the good citizens of Toronto, Canada, will be forking out their dollars for the privilege of a trip aboard the world's first Space Flight Sim — forty million dollars' worth. Up to 40 punters at a time get a guided tour round the Solar System — using sim techniques familiar from Mariner and Voyager probes. Even the inside of the capsule is equipped á la mode, with warnings about vacuum, etc. Also featured: asteroids, Jupiter orbit, and near brushes with man-made debris. Can't wait.


EMERGENCY DEPRESSURIZATION EQUIPMENT
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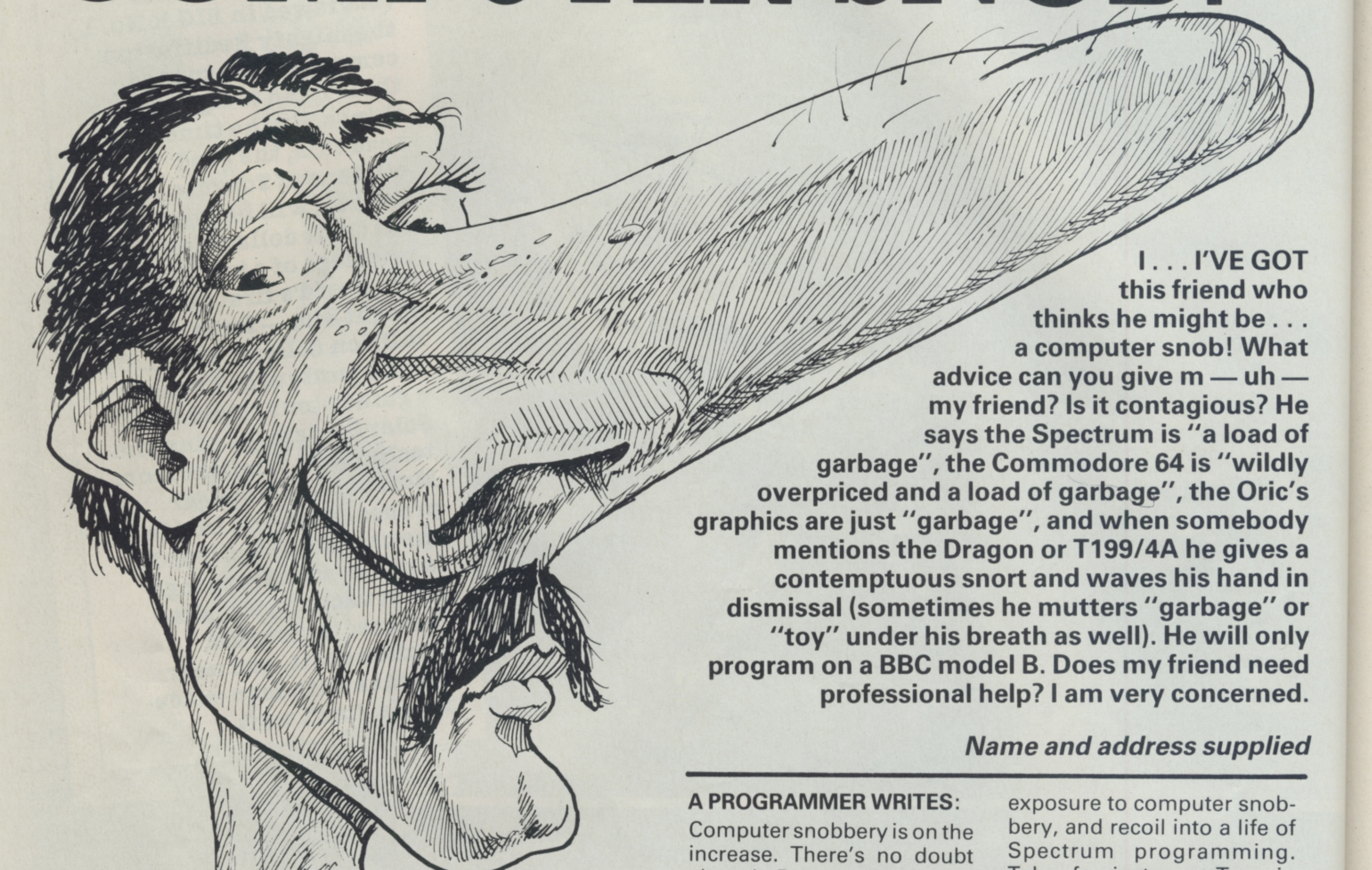
BIG K GOES ALL ELITIST...

CONFESSIONS OF A COMPUTER SNOB!



I . . . I'VE GOT this friend who thinks he might be . . . a computer snob! What advice can you give m — uh — my friend? Is it contagious? He says the Spectrum is "a load of garbage", the Commodore 64 is "wildly overpriced and a load of garbage", the Oric's graphics are just "garbage", and when somebody mentions the Dragon or T199/4A he gives a contemptuous snort and waves his hand in dismissal (sometimes he mutters "garbage" or "toy" under his breath as well). He will only program on a BBC model B. Does my friend need professional help? I am very concerned.

Name and address supplied

By ANDY GREEN

A PROGRAMMER WRITES: Computer snobbery is on the increase. There's no doubt about it. But not all of it is as blatant as your prob — ah, that is, your friend's problem or the opinion of Samson 'Zit' Dandruff, who aired his view in a recent interview with BIG K:

"It's obvious to anyone who looks into the subject *at all* that a BBC is *totally* superior to *any* of the sub-£1,000 micros available now, yah?

"I mean, look," explained 'Zit' with obvious distaste, "even the much vaunted Sinclair QL has only *four* colours on the screen at tops, yah? And *useless* sound?

"And what is one to think of the Spectrum's *absolutely garbage* colour scheme?", wondered 'Zit', shaking his head, and then leaning forward confidentially, "A machine for absolute *plebians,* yah?"

Some people have been permanently damaged by exposure to computer snobbery, and recoil into a life of Spectrum programming. Take, for instance, Tarquin Smith, recently voted Spectrum Programmer of the Week for his classics *Shoot The Capitalist Alien Scum Where Their Sun Don't Shine* and *(Squeeze)The Scarlet Pimple*. Here's an extract from an interview he gave to TIME magazine last year, at his Spanish Villa purchased with royalties from his two hits.

CAPITALIST PLOY

"Er, Sinclair is to be praised for, er, bringing the micro to the masses, so to speak, ha ha. The Spectrum is a people's machine in the truest sense of the word, uh, just like a Volkswagen.

"Er, the Capitalist-supported micros such as the establishment 'BBC' micro — run by extreme right wingers, as everybody in the know, er, knows — go for a large profit margin to swindle the working class and the unemployed from their hard earned wages!" Tarquin told us, sipping from his dry Martini and taking a drag from his cigar. "Or, er, supplementary benefit," he added thoughtfully.

Some of the worst afflicted computer snobs attain the height of their sadistic pleasures by becoming software reviewers for magazines. When they grind a program into the dust and spit on its limp remains, some try to justify their actions by claiming they are weeding out the good programs from the chaff.

Tom 'No K's' Hoffmann, variously described by experts in the field as a 'big-headed twit', a 'jerk' and 'a snob' defends his reviews.

"Computers," he begins in his monotone voice, fingering his ear-lobe and looking away to one side, "are capable of much better.

"The main reason why games aren't very good at the moment is that one programmer can only do so much. Programs written by teams are going to be much, much better. Take *The Hobbit*, for example.

"Really, although it was good at the time, *The Hobbit* is a very simple adventure. Without graphics, as in the BBC version, it really isn't worth playing," he added.

"I don't know about you, but arcade games simply bore me to tears," he yawned. "They're all the same. Once you've played *Space Invaders*, you've played them all."

However, some small retailers and software houses have been claiming that large software houses with massive monetary backing will be the death of them. Jack Fudge — who runs Cheap-Jack software from the back-room of a run-down fish and chip shop in Romford — agrees.

CORPORATE GREED

"Imagine," says Fudge. "An' Bug-Byte. And blooming 'Soffware Projecks' . . . Pah! 'Sgetting like an honest bloke can't earn a decent livin'. Bloomin' Fassischts, thass what they is," he added, pausing to pick out a chip from his desk and chew it gloomily.

"Issat fancy packagin' wot does it, yer mark me words, boy. Wiv us the cussomer knows what e's getting, know what I mean? None of that fancy gold stuff — we wrap the cassettes in chip bags so as yer can see jus' whass yer's gettin' . . . clean ones, mind you," he confided, pointing to a torn cardboard box over in a corner spilling greaseproof chip bags onto the floor.

Mr Fudge, whose company's bread and butter is the games tape *'One Thousand Super Awesome One Line Games For The Jupiter Ace'*, claims that big companies are 'conspiring' to push the smaller companies out of the marketplace. He cites the instance that his tape for the Jupiter Ace was selling "tens of units" a week until about six months ago, when for some reason he suddenly wasn't able to sell any at all.

"'S pretty obvious to me, yer know what I mean, that this was not unconnected, yer know what I mean, with Virgin Games bringing out a new batch of programs, are yer with me?" Fudge told BIG K darkly.

But what can be done to help the certified snob? We asked Dr X.S. Verbiage, a top specialist in the field, for some handy tips:

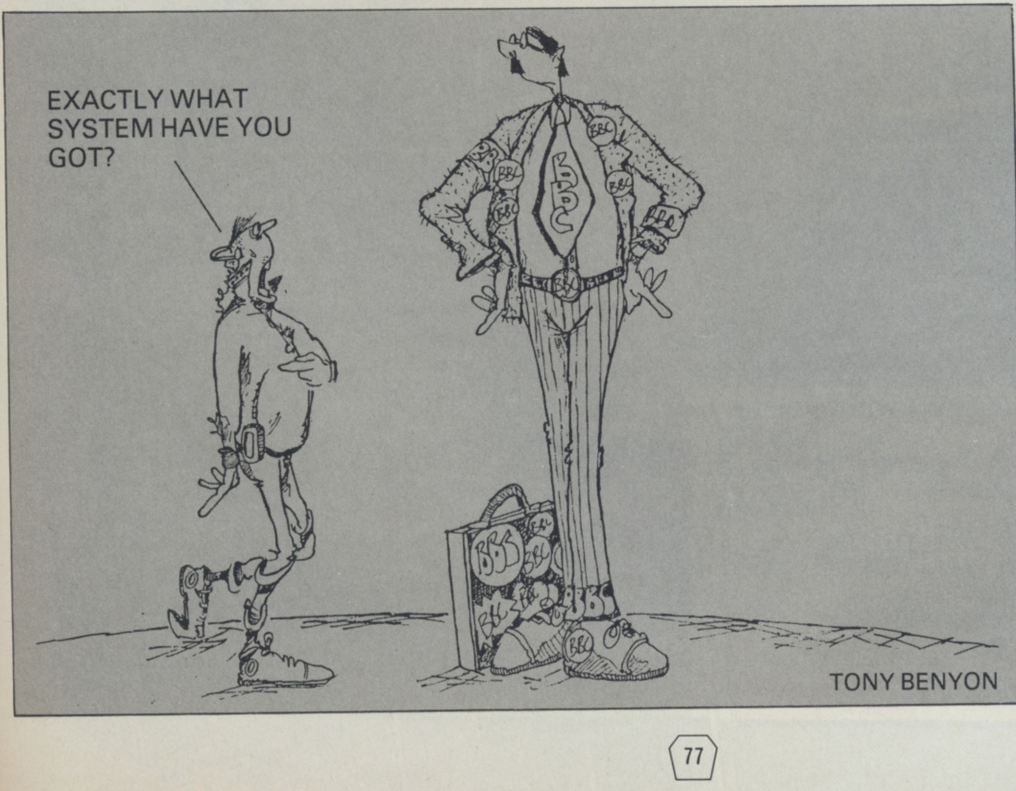
**Don't let him read an American magazine called *BYTE* — if necessary feed him *BIG K* intravenously.

**Make him use a Spectrum at least once a month at first, then with increasing frequency. If the case is very bad, start him off with just touching a Spectrum keyboard for five seconds at a time.

**Burn any books by Lance Leventhal or Rodney Zaks.

**Make him use tape recorders again instead of his new disc drive. Nothing humbles a hacker so.

**If none of the above works, shoot him. Or yourself.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TONY BENYON

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Hare Lifts

for VIC-20 by KEVIN HUGHES

Hop the rabbit along the girders. When over a lift hit the fire button on your joystick. Keep going till you get the carrot at the top — watch out for falling barrels. Eight levels to conquer.

WARNING
Joystick will only function if the cassette unit — and printer, if fitted — is switched off. Program only just fits into unexpanded VIC-20.

```
0 POKE51,192:POKE52,27:POKE55,192:POKE56,27
1 QT=999999
2 DIMBP(2)
3 POKE36878,2
4 NN=150
5 C1=1:C2=1
7 NH=230:NJ=230
8 LE=0:B=1
9 RESTORE
10 POKE36879,8:POKE657,128
11 POKE36869,240:POKE657,128
12 POKE37154,127
20 PRINT"⌐"CHR$(14)
30 PRINT"▮▮▮▮       IARE LIFTS"
40 PRINT"▮▮▮▮▮▮▮     IY ⁄EVIN  IUGHES"
50 PRINT"▮▮▮▮▮◣      ▘RESS IUTTON"
60 IFPEEK(37137)<>94THEN60
65 PRINT"⌐"
70 FORT=0TO100
80 READA:IFA=-1THEN110
85 POKE7168+T,A
90 NEXTT
110 DATA0,0,0,0,00,0,0,0
120 DATA66,165,24,24,60,24,24,60
130 DATA60,66,153,165,165,153,66,60
140 DATA255,0,16,56,84,16,0,255
150 DATA255,24,36,36,66,66,129,255
160 DATA36,52,24,126,126,60,24,24,-1
200 PRINT"⌐▮@@@@@@@@@@@@@@@@@@@@@@"
205 FORT=0TO20
210 PRINT"▬▮@@@@@@@@@@@@@@@@@@@@@@"
215 POKE7701+(T*22),0
220 NEXTT
235 POKE36867,42
240 POKE36869,255
250 TI$="000000"
255 PRINT"▮"
256 FORT=1TO5
260 PRINT"▮▮▮DDDDDDDDDDDDDDDDDDD"
270 S=INT(RND(0)*16)+2
280 PRINT"⌐"TAB(S)"▮C"
290 NEXTT
291 PRINT"▮▮▮▮▮E"
300 P=8098
310 LE=LE+1:IFLE=1THENTT=250
320 IFLE=2THENTT=150
330 IFLE=3THENTT=100
340 IFLE=4THENB=2:TT=150
350 IFLE=5THENB=2:TT=100
355 IFLE=6THENB=2:TT=70
356 IFLE=7THENC2=0:B=1:C1=0:TT=70
357 IFLE=8THENC1=0:C2=0:B=2:TT=70
358 IFLE=9THEN10000
360 BP(1)=7747:BP(2)=7766
365 P1=1:P2=20
370 X=PEEK(37137):IFX=110THENPP=-1
380 IFPEEK(37152)=119THENPP=1
390 IFX=122THENP=P-22:J=1
400 IFX=94THEN1000
405 PRINT"▮▮▮LEVEL"LE"▮TIME "TI$
406 PRINT"▬▮▮▮▮▮▮▮▮▮▮▮FAST ";QT
410 BP(1)=BP(1)+1:P1=P1+1
420 IFPEEK(BP(1)+22)=3THEN2000
430 IFP1>19THENP1=1:BP(1)=BP(1)-19
440 BP(2)=BP(2)-1:P2=P2-1
450 IFPEEK(BP(2)+22)=3THEN2200
455 D$=MID$(TI$,5,2)
456 V=VAL(D$)
457 IFV/3=INT(V/3)THENC1=1
```

continued on page 83

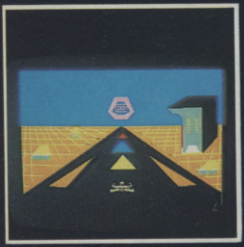
TRIED & TESTED
BIG K
GAMES

ILLUSTRATION: TONY JOZWIAK

System 3 Software...Graphically Amazing!

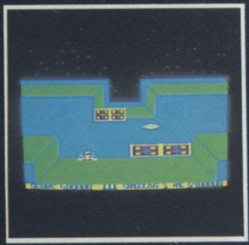
DEATH STAR INTERCEPTOR

LAUNCH



(Screen 1)

DURANIUM BARRIERS



(Screen 4)

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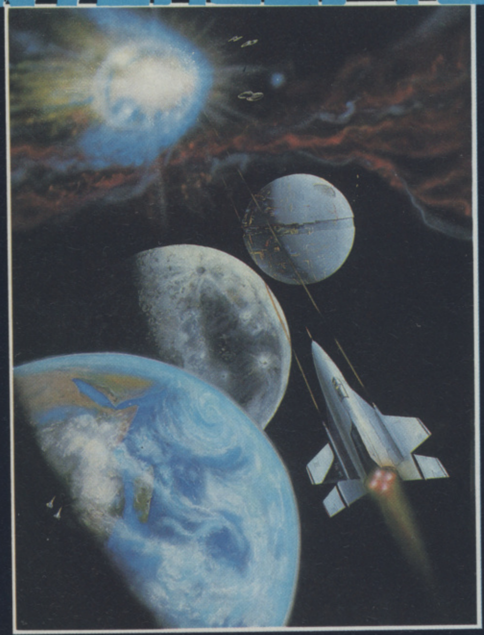
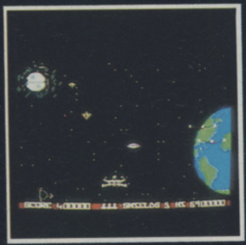
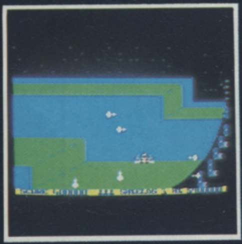


APPROACH



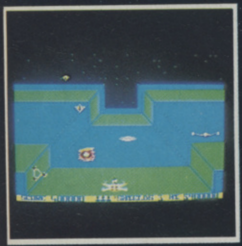
(Screen 2)

INTERCEPT MISSILES



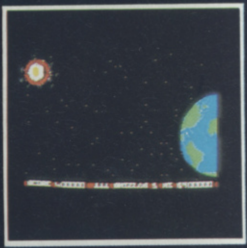
(Screen 6)

ENTRY



(Screen 3)

VICTORY



(Screen 12)

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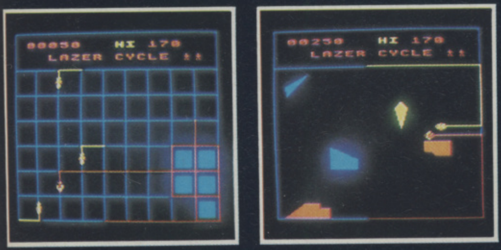

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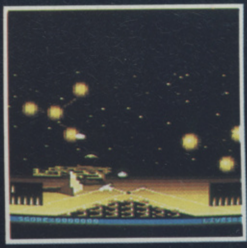

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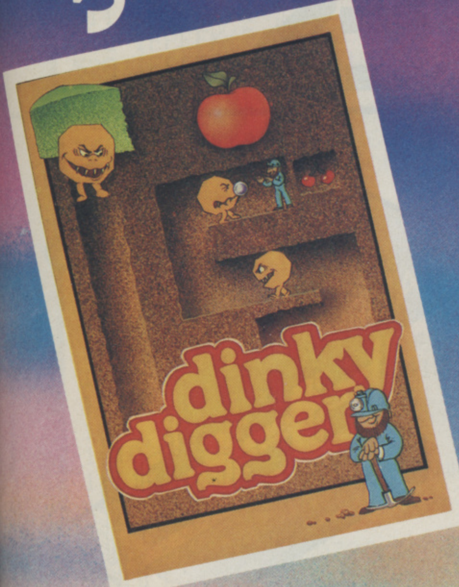

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EXCITE
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ANAGRAM
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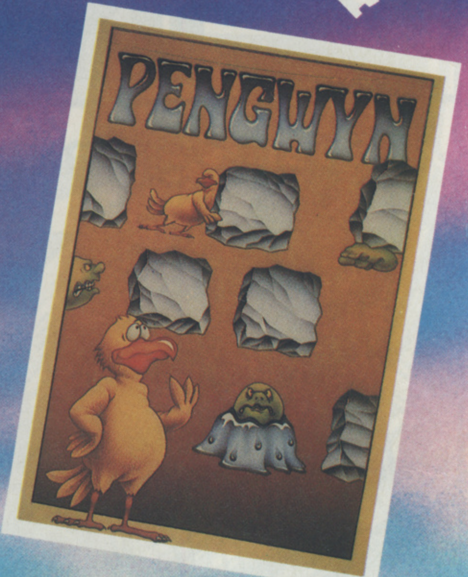

1 2 3

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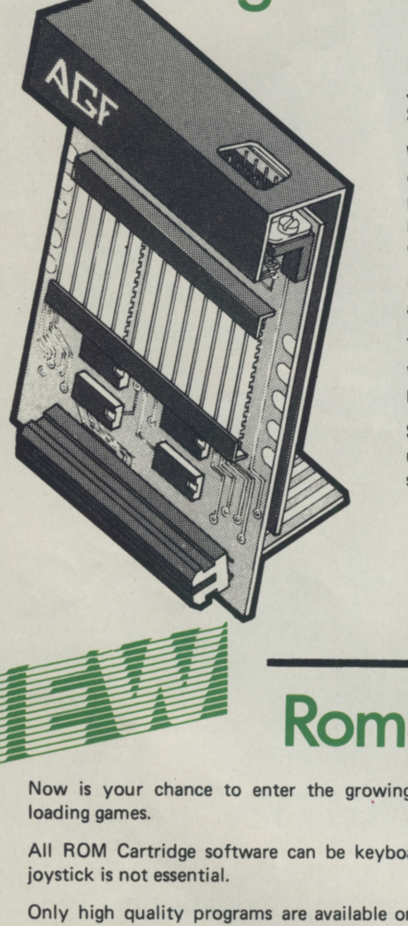
SPECTRUM ZX81

INTERFACES

Programmable Interface



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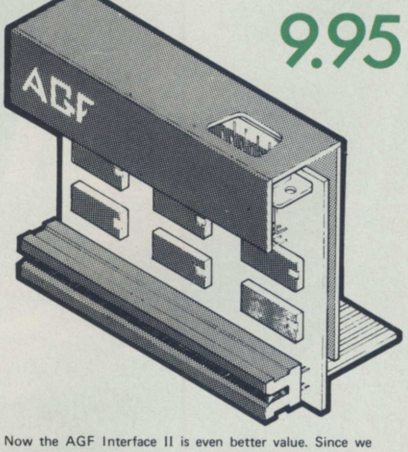

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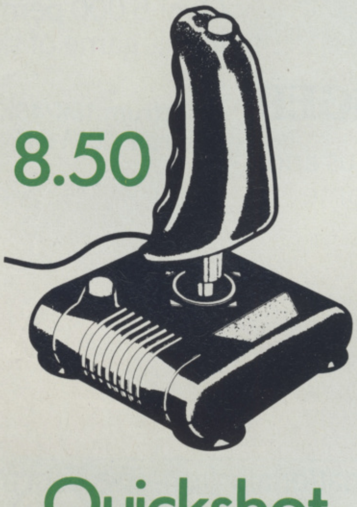

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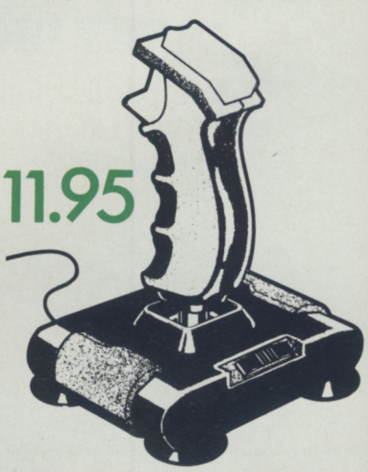

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```
458 IFV/3=INT(V/3)THENC2=1
460 IFP2<1THENP2=20:BP(2)=BP(2)+19
480 POKEBP(1)+30720,C1:POKEBP(1),2
481 POKE36875,NH
490 IFB=1THEN502
500 POKEBP(2)+30720,C2:POKEBP(2),2
501 POKE36874,NJ
502 IFPEEK(P+PP+22)=3THEN520
503 IFLE=8THENC2=0
504 IFLE=8THENC1=0
505 IFLE=7THENC2=0
506 IFLE=8THENC2=0
507 IFLE=8THENC1=0
510 IFLE=7THENC1=0
511 IFJ=1THEN520
512 IFPEEK(P+PP+22)<>4THENPP=0
520 IFPEEK(P)=2THEN5000
521 P=P+PP:PP=0
530 IFPEEK(P)=2THEN5000
540 IFPEEK(P)=5THEN6021
550 POKEP+30720,3:POKEP,1
560 FORT=0TOTT:NEXT
570 PQKEP,0:IFJ=1THENP=P+22
580 J=0
590 POKEBP(1),0
600 POKEBP(2),0
610 GOTO370
1000 IFPEEK(P+22)<>3THENGOTO410
1001 IFP<7768THENGOTO410
1005 CL=PEEK(P-66)
1006 CC=PEEK(P-66+30720)
1010 FORU=1TO4
1011 NN=NN+5:POKE36876,NN
1020 P=P-22:POKEP+30720,3
1030 POKEP,1
1040 POKEP+22+30720,5:POKEP+22,3
1041 FORT=1TO50:NEXTT
1042 POKEP+22,0
1050 NEXTU
1060 POKEP+22+30720,CC:POKEP+22,CL
1070 POKE+88,4
1080 GOTO410
2000 BP(1)=BP(1)+88
2001 NH=NH-10
2010 IFBP(1)>8120THENBP(1)=7747:P1=1:NH=230
2020 GOTO430
2200 BP(2)=BP(2)+88
2201 NJ=NJ-10
2210 IFBP(2)>8120THENBP(2)=7766:P2=20
2213 IFBP(2)>8120ANDB=3THENBP(2)=P+1:P2=20:NH=230
2220 GOTO480
5000 PRINT"▓":POKE36869,240
5010 PRINT"▓▓   YOU SURVIVED FOR    "
5020 PRINT"▓▓▓▓     "LE
5030 PRINT"▓▓▓▓▓▓       ATTEMPTS"
5031 IFLE>1THENPRINT" "
5032 PRINT
5040 PRINT"▓▓▓▓▓▓▓▓▓  PRESS FIRE BUTTON
5041 POKE36876,0:POKE36875,0
5042 POKE36874,140
5050 FORI=1TO600
5060 GETA$:NEXTI
5062 POKE36874,0
5100 IFPEEK(37137)<>94THEN5100
5200 GOTO3
6021 NN=150:NH=230:NJ=230
6022 POKEBP(2),0
6023 POKEBP(1),0
6030 GOTO255
10000 PRINT"▓▓▓FINISHED!!!!"
10010 T=VAL(TI$)
10020 IFT<QTTHENPRINT"▓A NEW RECORD!!!":QT=T
10025 POKE36875,0
10026 POKE36876,0
10027 POKE36874,0
10030 GOTO5050
20000 PRINTPEEK(37152):GOTO20000

READY.
```

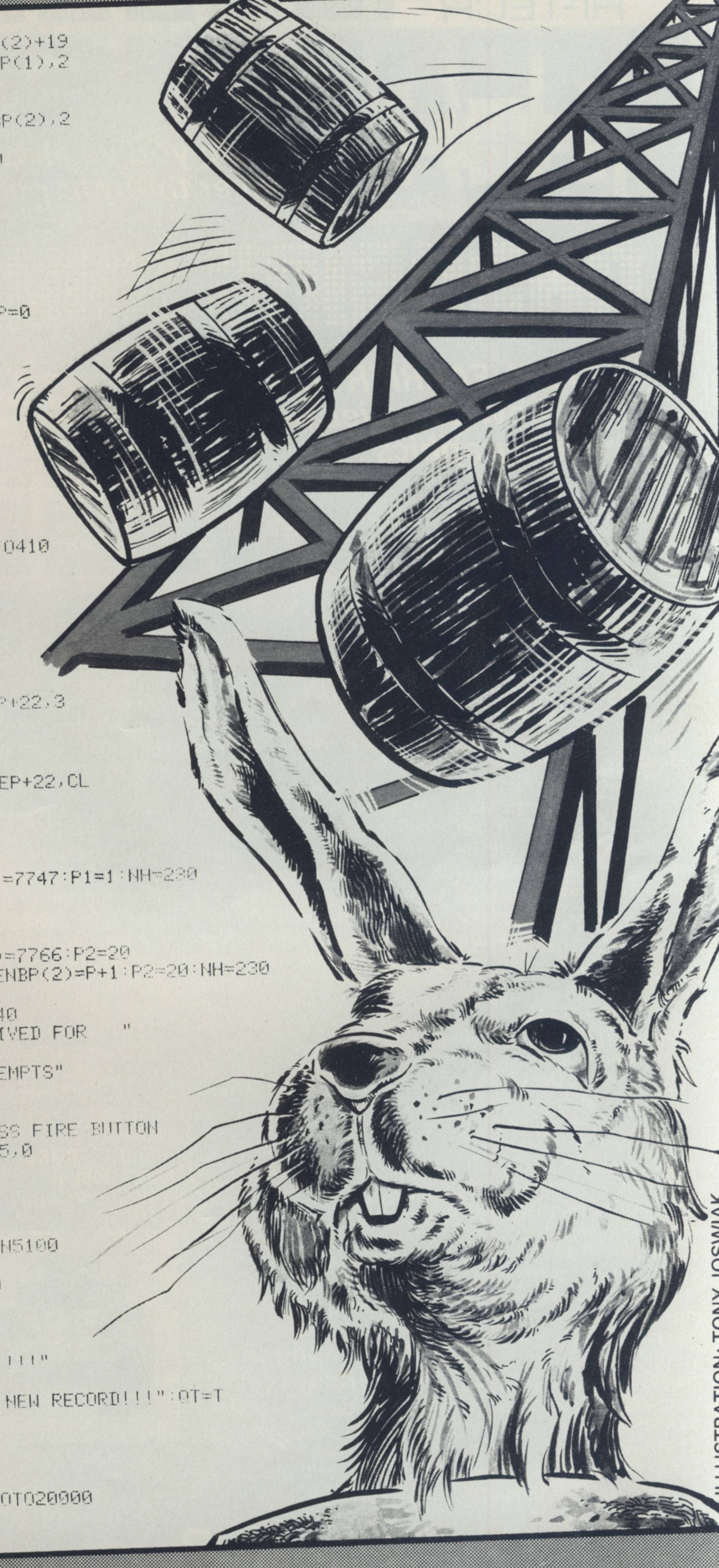
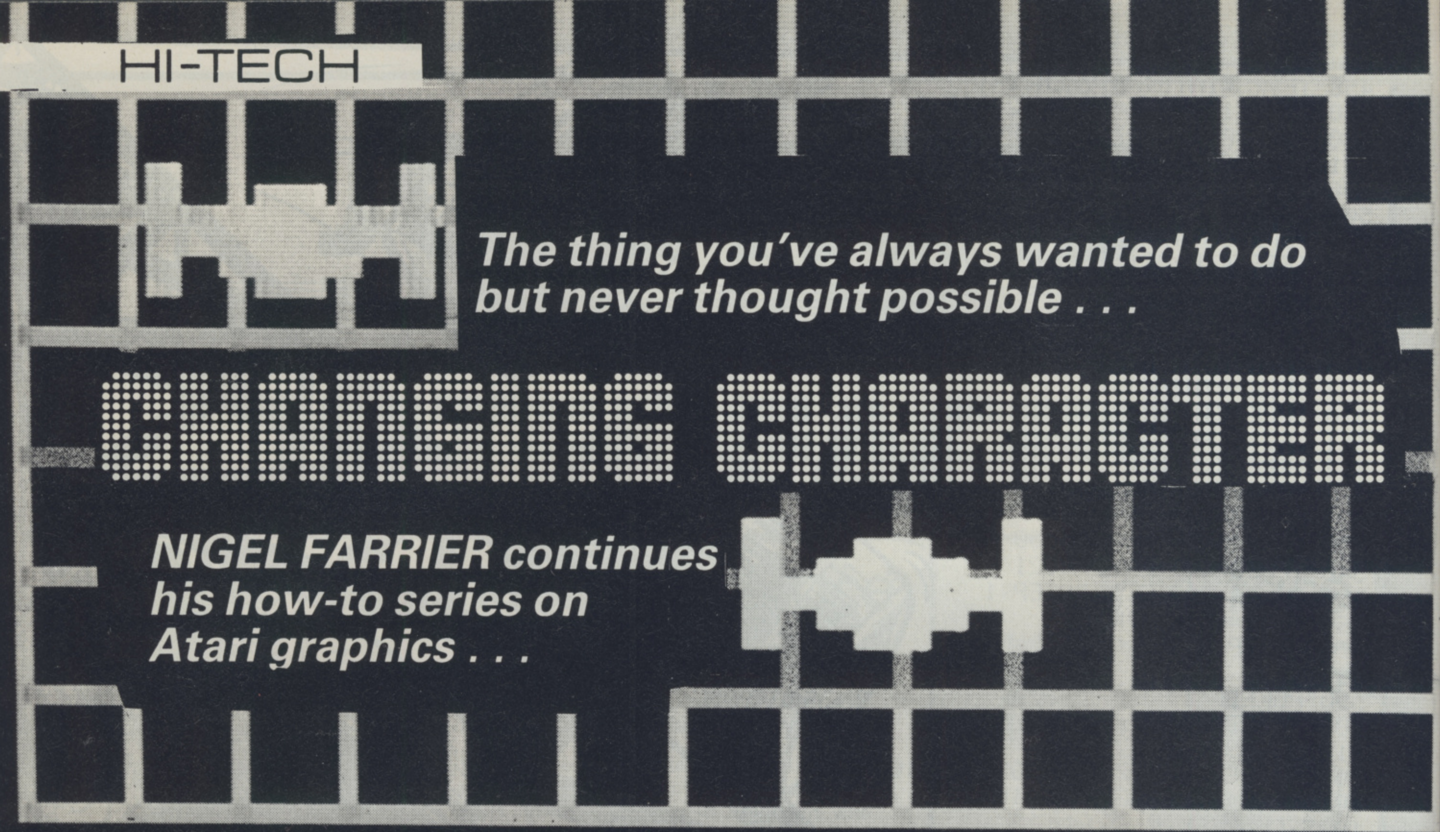


ILLUSTRATION: TONY JOSWIAK



The thing you've always wanted to do but never thought possible . . .

CHANGING CHARACTER

NIGEL FARRIER continues his how-to series on Atari graphics . . .

THIS MONTH I intend to give you a brief overview of how to redefine the character set on the Atari 400 and 800. My eventual aim, after covering Antic Mode 4 next month, will be to use this to write a short game for you. As I have not written it yet myself your guess will be as good as mine as to how it will turn out!

In-built characters

The Atari holds its own 256 characters in ROM or Read Only Memory. It actually only holds half of them but who is counting? Because the characters are situated in ROM we hit our very first snag (and you thought that this was going to be easy!). You cannot write to ROM to change them. Fortunately Atari did give us location 756. If you PEEK (756) you will get back the number 224. What this number actually refers to is 'page' 256 in the computer's memory. As a page is 256 bytes long, page 224 is pointing to 224★256 which (for those of you without a calculator) is 57344. Lo and behold this just happens to be the first memory address of the ROM and it is the beginning of the data for the in-built character set.

This is therefore going to make our job simplier (see — you were right, this *is* going to be easy after all). All we have to do is to POKE memory location 756 with another number and the computer will then believe that the character set is somewhere else and start using that one. You've probably guessed by now that we will point it to our own redesigned set.

Yet another point to remember here. Every time you execute a GRAPHICS statement, location 756 is reset to 224. You must therefore remember to POKE this location with the page number of where your character set resides. If not your display will not be quite what you expected.

Relocating the character set

All we have to do now is to decide where to put said character set. The normal place for this is at the top of RAM, otherwise known as MEMTOP. The location of MEMTOP is held in location 106. PEEKing (106) will give you different results depending upon whether your machine is a 16K, 32K or 48K model. In order to stop our character set being written over by things such as a display list, we have to fool the Atari into thinking that it has less memory by POKEing location 106 with a number less than is already stored there.

As I will show you in a moment, we have to reserve 4 pages (i.e. 1024 bytes) at the top of memory for our character set. So naturally you would expect to enter the command **POKE 106, (PEEK(106)-4).**

Wouldn't you? No — unfortunately certain functions will overrun MEMTOP so we will have to lower the location by even more. Normally I take 8 off of it just to be on the safe side.

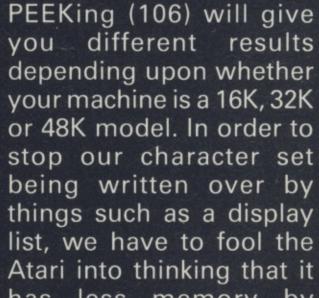


FIGURE 1

How the character set is stored

Each character is stored as a series of 8 bytes. If we look at the character 'A' it is stored as 0,24,60,102,102,126,102,0. Figure 1 shows how this makes up the letter.

The character is on a grid of 8 by 8. Each of the eight rows is used to calculate a number from 0 to 255 depending upon which square is filling in (i.e. shows on the screen) or not (i.e. background). Therefore, the second row we would have the binary number 00111100 (or 60 in decimal), and the sixth row it would be 01100110 (or 102 in decimal). One thing of note here. All characters have pairs of adjacent blocks filled in. You will not find a character with only one block on its own as this would give an artefact effect on the screen. We will be using that with great effect in our game (I hope).

There is only one more major stumbling block to overcome. That is that, although the letter 'A' has an ATASCII code of 65, it is in fact the 33rd character stored in memory! Weird. But at least there is some sort of logic to it. Figure 2 shows that the first 32 graphics characters have been swapped so that they now run from the 64th character in memory.

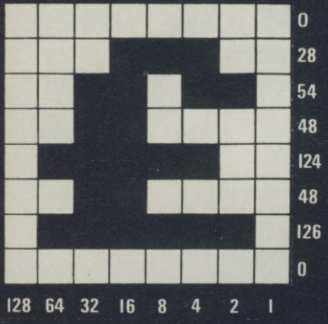


FIGURE 2

As you can see, if you intend only redefining the lowercase letters there is no problem as they are still in their correct place.

As each character is eight bytes of data long, to obtain the start of any lowercase letter we have to multiply its position by 8 before adding the result to PEEK(756)*256 — the location for the start of the character set.

Having waffled on for long enough let us get down to some programming.

Your new character set

You now have a choice to make. If you are going to change only some of the characters then it pays you to copy — from ROM to your reserved place in RAM — the whole of Atari's set and then to change the ones you want. If you are not going to use any of them then this step will be pointless. We, however, will be using a large part of the original so our first step is to transfer it over. Our program will therefore start:

```
10 MEMTOP=PEEK(106): POKE 106, MEMTOP-8: GRAPHICS 0
20 RDCHSET=(MEMTOP-4)*256: FOR X=1 TO 1023: POKE RDCHSET+X, PEEK(57344+X): NEXT X
30 POKE 756, RDCHSET/256
```

Line 10 reserves our area of memory for us and gets rid of what was there by executing a GRAPHICS 0 statement. Line 20 is a FOR NEXT loop that looks at the values in ROM and POKEs these into our reserved area. Line 30 then tells the computer where our new character set resides. This whole process takes about 10 to 15 seconds and can be speeded up by using a machine code program. Space, unfortunately, does not permit that this time.

Now . . . all we have to do is to change the ones we want and we are in business. Just as an example for now I will show you how to change one of the characters. I am going to change the 'hash' symbol (the one above the 3) into a true British pound sign.

CHARACTER TYPE	ORDER IN MEMORY	ATASCII ORDER
UPPERCASE NUMBERS & PUNCTUATION	0 to 63	32 to 95
GRAPHICS CHARACTERS	64 to 95	0 to 31
LOWERCASE & SOME GRAPHICS CHARACTERS	96 to 127	96 to 127

FIGURE 3

First you have to map out on paper (graph paper is easiest) how it will appear. Then calculate the eight numbers you will have to POKE into memory. In Figure 3 I have designed a pound sign and done just that.

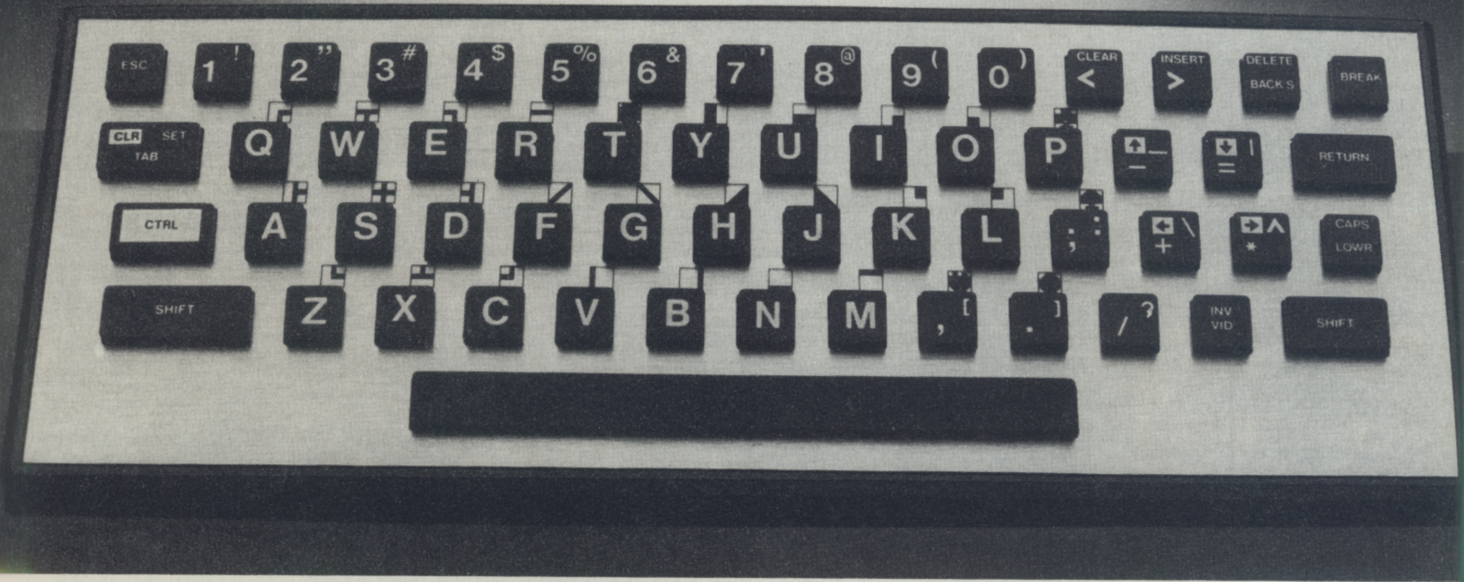
The hash symbol is the 35th character so, according to Figure 2, it will be the 3rd character in memory. We therefore need to POKE RDCHSET+(3*8) with the first number and so on. Our next few lines therefore look like:

```
40 FOR X=0 TO 7:READ A:POKE RDCHSET+(3*8)+X,A:NEXT X
50 DATA 0,28,54,48,124,48,126,0
```

If you now RUN this program, every time you type SHIFT and 3 you will get a pound sign — until, that is, you type in GRAPHICS 0 without POKEing 756 with RDCHSET/256!

Now I have got you all totally confused I will try and make it worse next month!

A VITAL PIECE OF SOFTWARE FOR ATARI 400 OWNERS.


ESC 1 ! 2 " 3 # 4 $ 5 % 6 & 7 ' 8 @ 9 (0) CLEAR < INSERT > DELETE BACK S BREAK
CLR SET TAB Q W E R T Y U I O P – = RETURN
CTRL A S D F G H J K L ; : + \ * ^ CAPS LOWR
SHIFT Z X C V B N M , [.] / ? INV VID SHIFT

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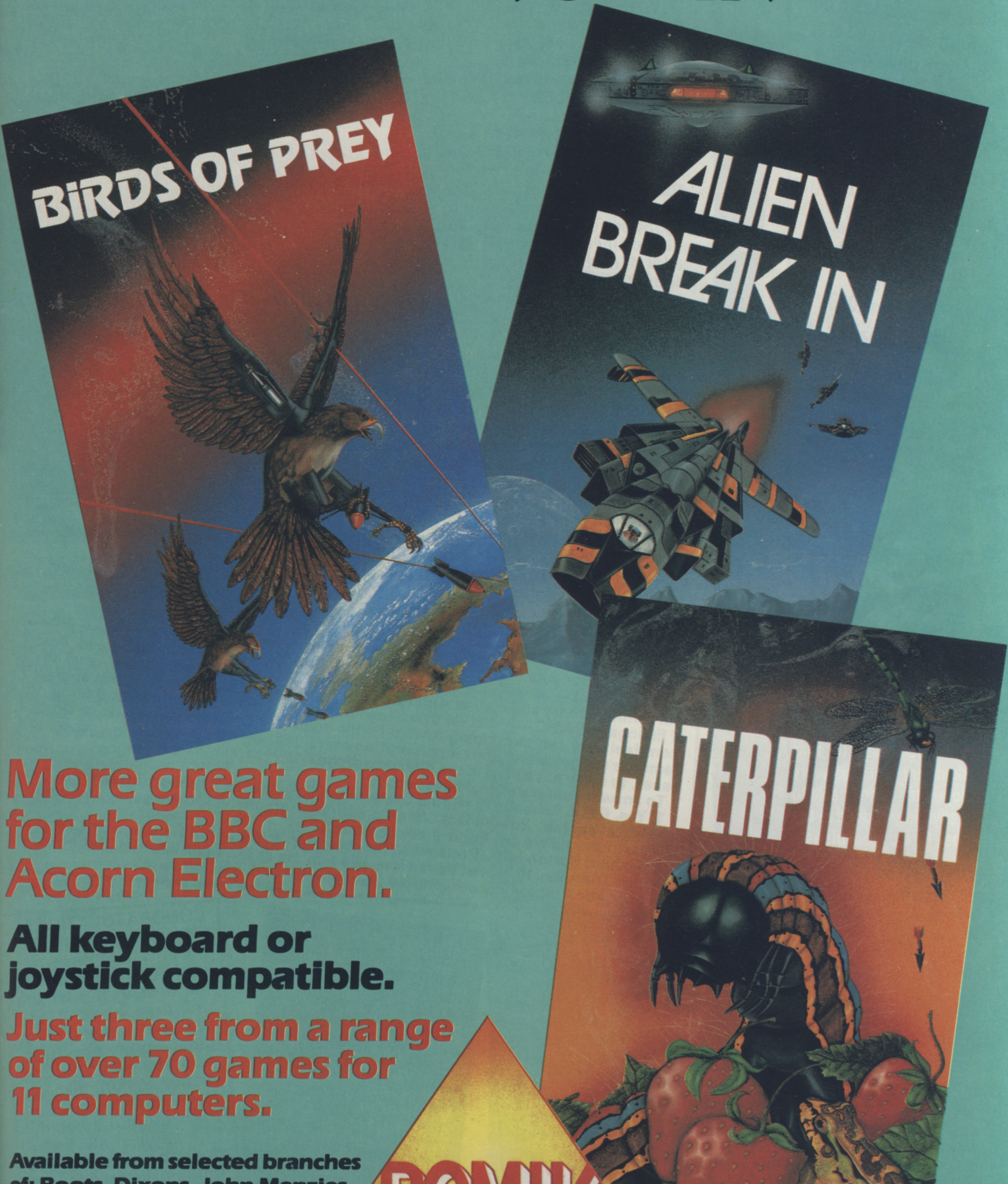
Three more challenges from ROMIK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Letters to BIG K

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PROG
A
COMPUTER CASSETTE C15

Cunning Blag

Your free gift in issue 1 was a brill CIS cassette that worked very well. I was very disappointed to be unable to find anything as good in the shops. Could you please, please send me some Big K computer tapes, or tell me where I can buy one.

P.S. I love your mag.

J. Clarke,
Newcastle upon Tyne.

We had a lot of compliments on our BIG K cassette, which we here prefer to call a Data Slug. The hi-quality clear plastic . . . the little brass screws . . . the whole thing just oozed quality. And as it happens (pause to cough and shoot cuffs), due to the fact that we had to order them in the megaquantities, there ARE one or two left over. Stand by for an upcoming special offer.

They Can Read Us ANYTIME . . .

IT WAS nice to read a computer magazine with a news section that didn't genuflect to all and sundry, but didn't automatically slag everyone off, either — and included the very interesting and perhaps potentially controversial Budapest Beebs story.

Alos welcome was the inclusion of articles about computer PEOPLE rather than just computers, as well as equally rare topics like real flight simulators and computer crime — smart. Don't ease up in the features department (Paul Walton certainly gets around).

The software reviews were superb, I think probably the best I've seen — an opinion formed after reading every magazine around. Don't just review games, though. A word processor and a data base reviewed in each issue could be useful. I was also pleased to see that reviews weren't completely dominated by Spectrum programs: too many people forget that there's life after ZX. Especially good (to me) was the sprinkling of Dragon reviews. It's a machine a lot of magazines tend to overlook, especially in the software area, and they seem to forget they could be losing about 150,000 potential readers.

The personality reviewer is a neat touch but Charts don't really serve much purpose — by the time a game reaches the top, it's hardly necessary to trumpet it much more. Another major weakness is that Charts have an automatic bias towards machines which have sold most.

In the hardware department I really enjoyed *Squaring Up.* I mean, what's wrong with a bit of good-natured aggro?

I keyed in *Demon Driver.* It was no worse than any I've entered from any other magazine and better than many, but really, no-one's really likely to play these pseudo-arcade games. Small utilities would be vastly preferable as well as leaving extra space for another Fabulous Feature or two, perhaps even an additional Razzy Regular or some more Heavenly Hardware.

The magazine's title is, well, horrible. It's a shame to spoil Classy Contents with a Naff Name.

Last of all, a couple of personal questions:

1. Is Eddie Babbage any relation?
2. Richard Burton can't be, surely?

Keep up the good work. This is at least one copy you'll sell next month. In fact, I reckon you could find yourselves with a Big Klassic.

Cameron M. Black, Glasgow.

Many thanks for your letter, Cameron. A Marvellous Missive. A Splendid Screed. Post to Boast About — as we have here by printing (nearly) all of it. Regarding reviews, we will continue to try and review stuff for as many machines as possible. On this subject of listings in BASIC — what do other readers feel? All magazines do it, and none of them feel they can stop doing it. What's the solution? Carry on as before, or do as Cameron suggests and start incorporating more utilities? We propose, in upcoming issues, to sway not a little in the direction of the latter . . .

To answer your personnel questions . . .

1. Yes, Eddie Babbage IS related to the legendary Charles Babbage, inventor of the 'analytical engine'. Ed is in fact Chas's great-great-grandson. Do we gain extra credibility and should we pay Eddie more as a result?

2. Richard Burton is NOT related to the legendary Welsh-born Ham — sorry, Distinguished Thespian. He doesn't even look like him. He doesn't talk like him. But he sure can play *Atic Atac* (or any other hotso game) better than him.

CONGRATULATIONS! Your new magazine Big K is absolutely excellent. Well done! It's good to see a magazine that not only lists computer programs but tells you which games are the best buy. I placed my order for No. 2 as soon as I had put down No. 1!

**Warren Crawford,
Braunton, Devon.**

Shucks, Warren . . . what quick reflexes!

I THINK your new magazine is fabulous. Your reviews are excellent. Big K is also one of the most colourful magazines I've ever seen. Your magazine brings a new dimension to computers.

**V. Shanner,
Seaford, Essex.**

That's nothing. You should see what the Editor can do with used chewing gum.

CONGRATULATIONS! On what? For having the best computer mag out! Yes, I think Big K is the best in the known universe. All the reviews, news, features simply are great. And you don't put too many ads in, like so many other mags. Can I let you into a secret? I'm saying all these good things so that this gets printed. Oops! Sorry!

**Bernard McKeown,
Barnbridge, Co Down.**

Thanks, Bern. Your cheque is in the post.

ETTERBASELETT

K edited by NICKY XIKLUNA

Enterprising Reader

I HAVE heard rumours that the Enterprise will be able to accept and run both Spectrum and Commodore 64 programs. Please could you clarify these rumours, one way or the other?

John Priest, Wolverhampton.

The good news: Enterprise will be launching two converters this September along with their computer. These will convert Sinclair and BBC Basic into Enterprise Basic.

The bad news is that games written in machine code are unintelligible to the converters. There are no prices available for Enterprise peripherals as yet, and even The Shadow has been unable to detect the slightest sassuration of a whisper that says there may be plans for a Commodore converter. We'll keep you informed.

Electron Lust

Beautiful magazine — I'm impressed! I am soon to own an Acorn Electron and would like to know if you are going to list programs for it.

David Wayne, Leeds.

Most BBC programs (other than those in Mode 7) will run on the Electron while others need a few conversions to do so. However, you'll be transported with joy — at least as far as Mars — by the knowledge that the Electron has fans here at Big K. We'll carry on/soon be feeding its fat keyboard face with some delectable listings.

Putting The 'A' Team On HOLD

I AM an LSI component specialist for a multinational electronics company and one of my hobbies is using my BBC 'B' computer. I was therefore interested in your Eprom Programmer article ('BUILD A CHEAPO EPRO' — BIG K/April). However I would like to draw your readers' attention to the differences between a 2764 or 27128 and a 2764A and 27128A.

The A versions are replacing the ordinary versions from some manufacturers and although totally compatible in read mode, are programmed entirely differently:

1. They are programmed at Vppd12.5c, VCCd6.0v
2. They do not use a fixed 50ms pulse.

Instead they use so-called "intelligent" or "adaptive" programming algorithms which apply a 1ms pulse followed by a read/verify cycle. Further 1ms pulses are applied until a correct verify occurs, and then an 'overprogram' pulse of three or four times as long as the total number of 1ms pulses is applied (manufacturers vary in their algorithms). After the complete EPROM is programmed, a verify at VppdVccd5.0v is performed.

The intention of these algorithms is to speed up the programming time and also to ensure that every bit is programmed fully.

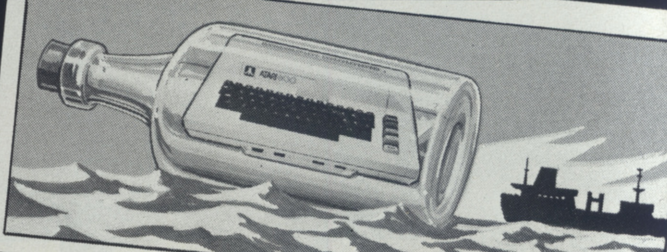
The duration of the pulses can total from 4 to 100ms and a fixed 50 ms pulse is NOT permitted — it can corrupt other bits in the same column.

Typically the 2764 will program in one and a half minutes rather than 7 minutes (try doing a 27512 — now available — it could otherwise take 40 minutes!). The net effect of all this is that plugging an -A version into 21v will kill it!

Could I suggest a follow-up article to cover a programmer for -A versions? The 12.5v and 6v could easily be obtained from the 15v auxiliary power output of the Beeb and the machine-code section of the program modified to follow these intelligent algorithms.

J. F. Cunningham, Takely, nr. Bishops Stortford

ANDY GREEN writes: these are new chips, as you say, and aren't yet available in retail shops. The 15v power line you mention in the Beeb is in fact 12v, and this would do very nicely as Vpp. Look out for an article on how to convert the BIG K Cheapo Epro to work with 'A' versions soon. For now, use only the 2764 and 27128 versions with the programs.



But Does He Have A Parrot?

I WAS very interested in Tony Tyler's review of the Atari 800 in Big K 1. To my knowledge, this is the first time a magazine has given this machine a good review other than to praise the graphics and liken it to a video games machine. Can you recommend a good basic manual for the Atari?

Also, I take a Spectrum 48K to sea with me as it is easier to carry than the Atari. No-one on board has had any luck at all with *Valhalla*. We are getting desperate! Can you offer any clues?

A. C. Lowe, M.S. Esso Tees, Somewhere at Sea.

The Editor writes: Well, hello, sailor! This question of a decent first-user manual for the Atari machines is a thorny one. There is an excellent expert manual *De Re Atari*, by Chris Crawford — but basic BASIC (as it were) is either incomprehensible, maths-obsessed and boring, or Hi-folks over-the-top chat-show style. On reflection, the latter — *Inside Atari Basic*, by Bill Carriss — is probably the best bet. I learned on it, anyway.

As for *Valhalla*, none of us here have any clues at all. No doubt somebody out there can weigh in with a tip or two . .

SIMULATED AIR FLIGHT
Sop
Sop
SICK BAG
TONY BENYON

Wildly Underrated

BIG K is excellent — its only faults being its lack of a letters page and the rating system for games. For example, *Atic Atac* would be wildly underrated at KKK.

Tim Hardy,
Bishops Stortford.

The problem, Tim old bean, with starting a letters page is that if you haven't been in existence long enough to attract letters you can't print them! As for the Rating System, we felt that too many other magazines use cumbersome perm-any-three-from-10 grid charts underneath each game — you need a calculator to solve some of these! We use our four-option rating system (don't forget the No K's option) in order to promote good writing from the reviewers. We figure that if the reviewer hasn't told you just what you need to know in his 'copy', then no railway timetable lookalike underneath will make you any wiser. Especially as that, too (when you come down to it) is subjective. What do other readers think?

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MUSIC, MAESTRO, PLEASE Continued

The first machines allowed the sampling of sounds for up to three seconds with a usable bandwith of frequency of up to 10k. They have recently updated the hardware (called 'voice cards'), and this now means that sampling bandwidth goes up to 16k. As well as being able to sample sounds it is possible to modify and combine sounds by using the operating software. Much of the sound creating process enables the user to change the wave form of a sound with a light pen.

As well as transposing such recorded and created sounds to a keyboard the machine can record up to eight tracks of sequential information and store this in real time when the keyboard is played. Some of this recording can be edited in what is called the 'Page R Mode' and it is this software which affords the musician such fantastic compositional scope.

Different

All the sounds in a composition can be reprogrammed if required and can be played by a completely different set of sounds. This allows for pretty wild experimentation . . . as well as this, because the Fairlight has eight output ports each soundtrack can be treated differently on the recording desk, wow . . . control yourselves; resist the temptation to jump on your Casio . . .

Now that the sampling of sounds is all the way up to 16k the quality of sound is pretty stunning and at £24,000 plus it's pretty expensive too. But remember: you don't have to buy one (you can hire them). So if you've composed something at home it won't be too long before you can use your micro to operate a Fairlight because they'll soon have MIDI interfaces (you'll probably still need a Fairlight programmer cause they're complex machines).

The next step in the 6809 CPU Fairlight story is going to be the series 3 which will employ 16 bit (as opposed to 8 bit) microprocessors and will be able to operate as 16 track digital tape recorders (as opposed to 8 at present), also to sample sounds for 2 minutes

Partly as a result of the introduction of digital synths like PPGs, Fairlights, and Syclaviers, synth programming has become somewhat of an art and many top producers like Trevor Horne and Martin Rushent will not venture into the studio without their programmers. So while traditional skills of musicianship are still very relevant the situation is beginning to change. In the future a combination of musical and programming skills will be needed to make music. This is already evident on the new trendy labels like Trevor Horne's ZTT.

Combination

MIDI makes possible many more combinations of synths and micros and thus serious music making will become possible for micro hackers but it still means that you will have to have a rudimentary knowledge of keyboard playing (although other instruments can be used keyboards are still the big favourite).

But what if you can't play? Voice activated music programming is something undergoing a lot of research at the moment, but industry observers reckon that it will be at least 3-4 years before you'll be able to hum a tune into a micro-synth system and have it played with the sounds of your choice!

Sound data bases might soon be available and it looks like the price of Emulator type technology seems sure to come down within the next few years.

A lot of software for writing music on popular micro's (using a keyboard) will have to be written and a lot more MIDI compatible hardware should be coming onto the market. Meanwhile, hack on . . . and if you've got some related progs, send them in.

P.S. I would like to thank Phil Nicholas for his help in preparing this article.

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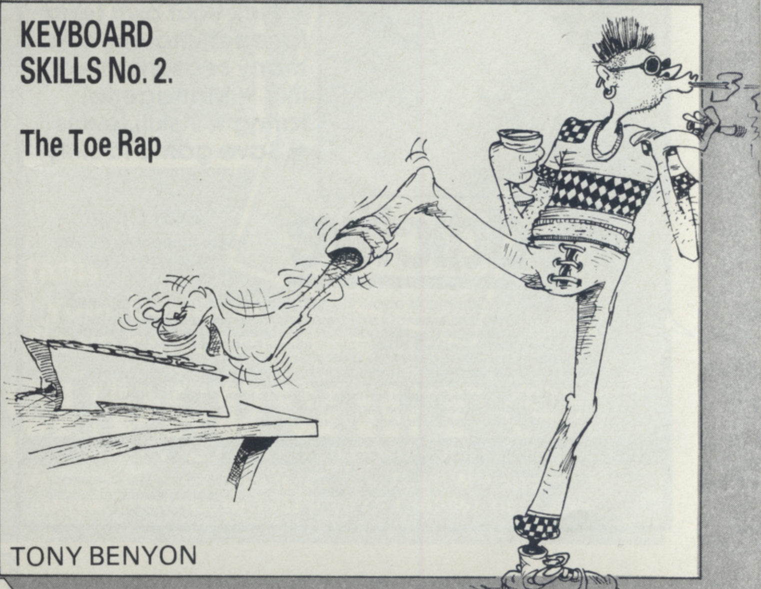

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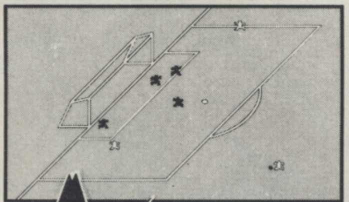

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* ZX81 Chart
Home Computing Weekly
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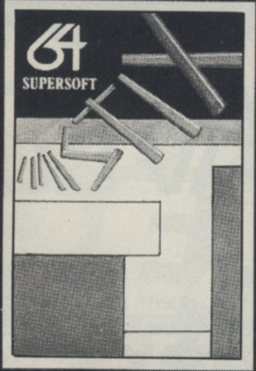
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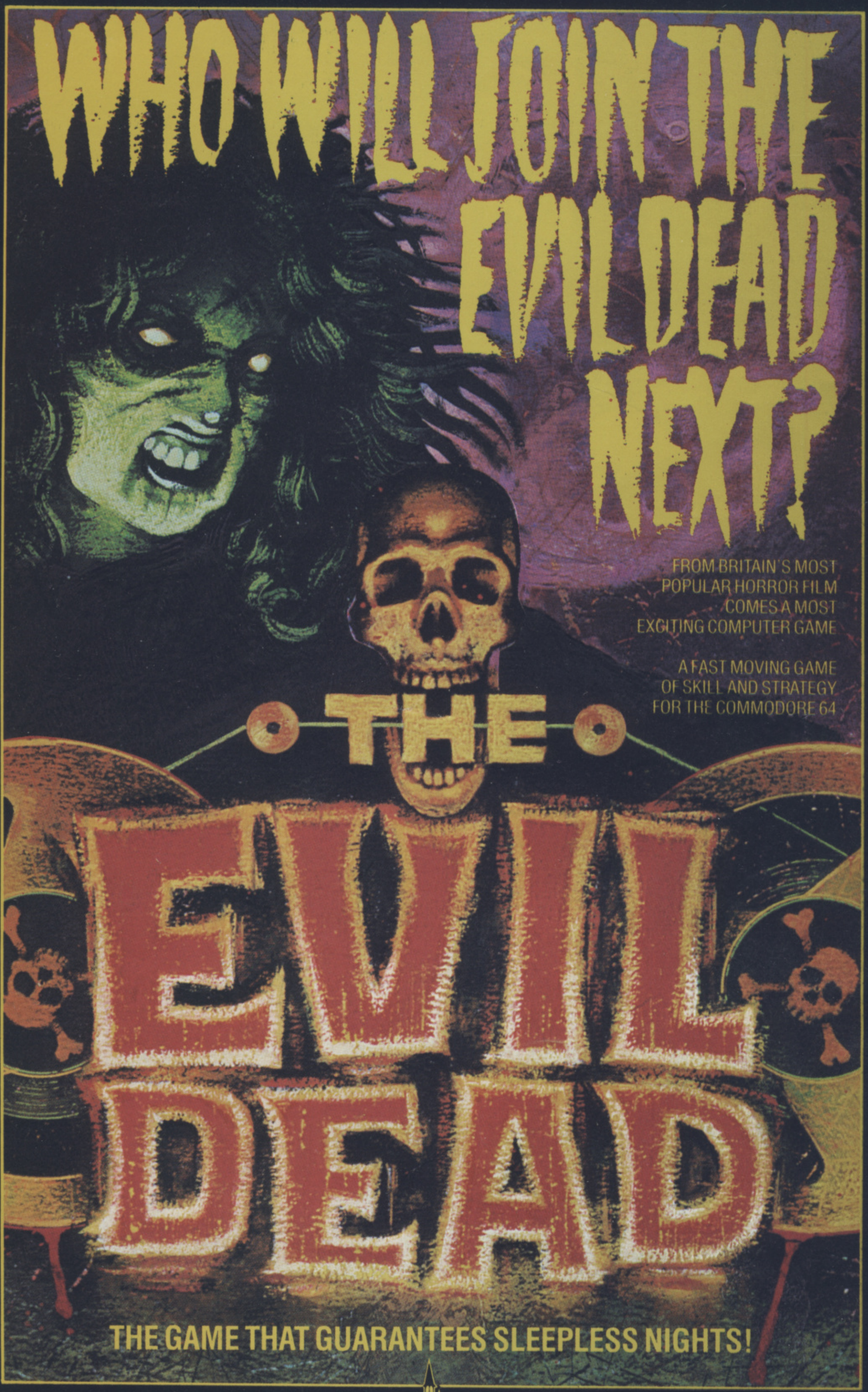
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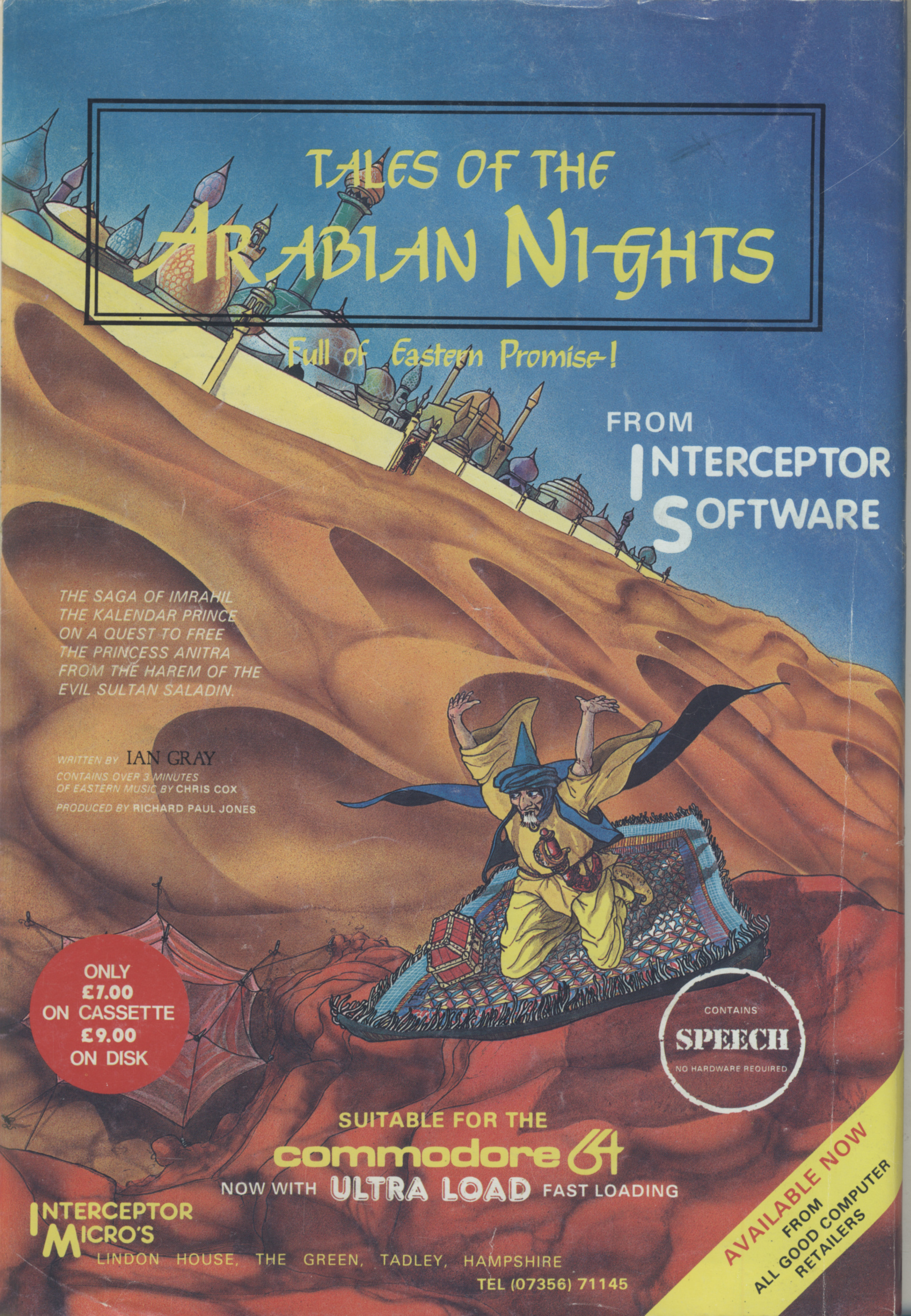

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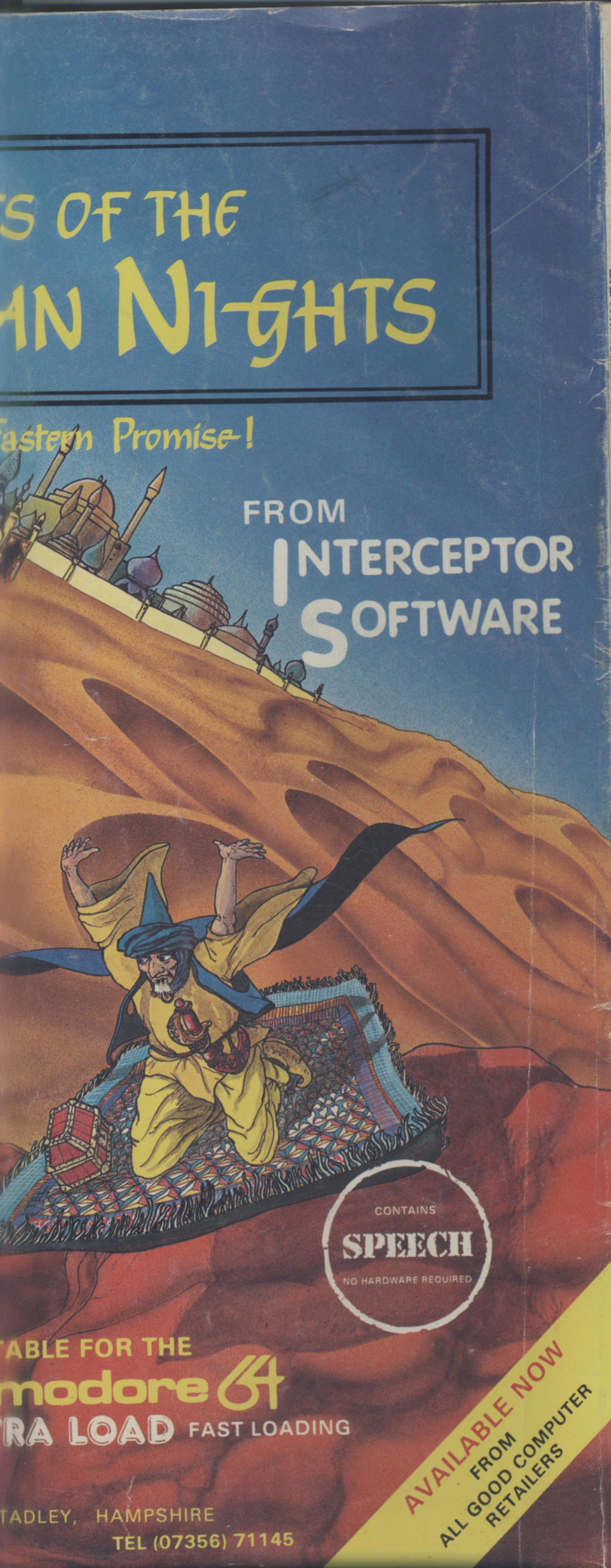

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